Mechanical Ventilation Heat Recovery Unit

novus (F) 300

Operating Instructions
Please keep next to the MVHR unit!

Status: 09.10

Device version:

- ☐ LEFT
- ☐ RIGHT
- ☐ Mounting position HORIZONTAL

Components suitable for Passive House Dr. Wolfgang Feist

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0 Preamble

Thank you for deciding on the **heat recovery unit novus 300**.

The heat recovery unit novus 300 has been built according to the current state of the art and the acknowledged rules on safety. The device is subject to permanent improvement and development. Therefore, your device may differ slightly from the instructions.
In order to guarantee a safe, appropriate and economic operation of the heat recovery unit novus 300, please observe and comply with all information and notes on safety in this operating manual.

Subject of this operating manual is the heat recovery unit novus 300 in different design variants. Possible accessories are only described insofar as it is necessary for the appropriate operation. Please see the particular manuals for further information on accessories.

The explanations in this operating manual are confined to the assembly, commissioning, operation, maintenance and the repair of failures of the heat recovery unit novus 300 and are addressed to appropriately trained personnel qualified for the particular work.

If you have any questions that have not been answered or have not been sufficiently answered in this documentation, please contact the company PAUL Wärmerückgewinnung GmbH. We will be glad to help you.

In addition to the general section, this manual consists of:

- **a section for the user and the installer;**
- **a section especially for the installer.**

PLEASE READ THIS MANUAL CAREFULLY BEFORE INASTALLATION AND COMMISSONING!
THIS MANUAL HAS BEEN MADE WITH GREATEST CARE.
HOWEVER, NO RIGHTS CAN BE DERIVED THEREFROM. WE RESERVE THE RIGHT AT ANY TIME TO PARTIALLY OR ENTIRELY CHANGE THE CONTENT OF THIS MANUAL WITHOUT PRIOR NOTICE.

1 Introduction

This section contains general information on the heat recovery unit novus 300.

1.1 CE Marking

The device is called novus 300, hereinafter referred to as the novus. Novus is a ventilation device with heat recovery for a healthy, well-balanced and energy-saving ventilation of living spaces.

Figure 1: Identification plate of the novus

1.2 Warranty and Liability

1.2.1 General Information

Our “general terms and conditions“ apply for the novus in the currently valid version. The warranty is aligned with the warranty terms of the manufacturer. This applies to mere replacement of the material and does not include the services. They apply only in case of proof of the performed maintenance according to our regulations by a skilled installer.

1.2.2 Warranty Terms

The warranty period for our MVHR devices is two years as of delivery from our factory. Warranty claims can be asserted exclusively for material and/or construction defects, which occurred during the warranty period. In the event of a warranty claim, the novus may not be demounted without prior permission of the manufacturer in writing. The manufacturer grants the warranty for spare parts only when they were installed by a skilled installer.

The warranty shall expire once/ when:

- the warranty period has elapsed;
- the device is operated without original PAUL filters;
- parts are installed which were not delivered by the manufacturer;
- the device is improperly used;
- the defects occur due to incorrect connection, improper use or soiling of the system;
- unauthorised changes or modifications on the plant are made.

1.2.3 Liability

The novus was developed and manufactured for use in so-called comfort ventilation systems. Any other use is considered as “improper use” and can result in damages to the novus or in personal injuries, for which the manufacturer cannot be made liable. The manufacturer is not liable for any damage, which is due to the following causes:

- Non-observance of the notes on safety, operation and maintenance, stated in this manual;
- The installation was not performed according to the regulations;
- Mounting of the spare parts, which were not delivered and prescribed by the manufacturer;
- The defects occur due to incorrect connection, improper use or soiling of the system;
- The warranty period has elapsed;
- Normal wear.

1.3 Safety

1.3.1 Safety Instructions

Please always observe the safety instructions in this operating manual. The non-observance of the safety instructions, warning notices, notes and instructions can lead to injuries or damages to the novus.

- Unless otherwise stated in this operating manual, only an authorised installer is entitled to install, connect, put into operation and maintain the novus;
- The installation of the novus is to be performed according to the general local building, safety and installation instructions of the corresponding local authorities, of the water works and electric works and other official regulations and directives;
- Always follow the safety instructions, warning notices, notes and instructions described in this operating manual;
- Please keep this manual during the complete life time of the novus in proximity to the device;
- The instructions for the regular replacement of the filters or the cleaning of the supply and exhaust air valves are to be strictly followed;
- The specifications stated in this document may not be changed;
- Any modification of the novus is prohibited;

- In order to guarantee that the device will be regularly controlled, it is recommended to conclude a maintenance contract. Your supplier can give you the addresses of authorised installers in your area.

1.3.2 Safety Appliances and Precautions

- The novus cannot be opened without tools;
- It must be excluded that the fans can be contacted with the hand. Therefore, air ducts must be connected to the novus. The minimum length of the pipelines is 900 mm.

1.3.3 Used Symbols

The following symbols are used in this manual:

Caution, special note!

Risk of: ***- injury of the user or the installer***
- damages to the device
- impairment of the operation of the device if the instructions are not carried out properly

2 Notes for the User and the Installer

This section describes how to handle novus.

2.1 Brief Description

2.1.1 Limitations of Use

The device is applicable for the ventilation in the living and office area (with restrictions in the industrial area) at air temperatures of -20°C to +40°C and normal air humidity. Any other type of use is considered as use for purposes other than intended. It is especially prohibited to use the device for the exhaustion of flammable and explosive gases. The installation is required in the frost-free area. For pre-heating of the outside air (in winter), an applicable plant-specific frost protection equipment should be connected upstream to the device.

2.1.2 Equipment Configuration

The novus is designed and manufactured for controlled home ventilation. The novus 300 in the standard design has a patented reverse flow channel heat exchanger without moisture recovery. The device model novus (F) 300 is equipped with a membrane moisture heat exchanger. The compact ventilation device is designed for the wall fastening on a mounting frame, whereby also a horizontal positioning on the side (design HORIZONTAL) is possible for both mounting options. The novus is delivered in the versions “RIGHT“ or “LEFT“. The design type is specified at the identification plate on the device.
The housing consists of the coated sheet, the sidewalls in the colour anthracite, and the detachable hood in aluminium white. The cover plate with magnetic clips for the filter maintenance consists of plastic dyed water blue. The internal lining made of high-quality polypropylene provides the necessary insulation and the device noise protection.

2.1.3 Heat Exchanger

The highly efficient reverse flow channel heat exchanger (German and European patent) made of plastic is designed so that the exhaust air and supply air ducts are arranged in the chequer-board pattern and, therefore, a duplication of the heat exchange surface can be achieved towards the plate heat exchangers.
With the moisture heat exchanger also humidity is transmitted besides the heat due to the chemical and physical properties of the heat exchanger membrane.
The air types that flow past each other are divided for both types of heat exchangers.

2.1.4 Fans

The novus includes two maintenance-free 230 VAC radial fans with the integrated power supply unit and electronic commutation. The volume flow constant fans keep the air quantity at a constant speed for each selected fan rotary speed. The air quantity is also not affected by soiled filters.

2.1.5 Filters

2 filters in Z design of the filter class G4 are installed in the device. They consist of a synthetic filter mat in a polypropylene frame. A pollen filter of the filter class F7 can be used as intake air filter.

2.1.6 Frost Protection

The novus is equipped with automatic frost protection which prevents that the heat exchanger freezes at very low outside air temperatures. The fans will be temporarily deactivated if the intake air temperature or the supply air temperature of the device falls below the threshold value.

2.1.7 Summer and Winter Bypass

The novus has a sensor-regulated motor-driven bypass flap. The summer and winter bypass is an additional circulation duct, which (temporarily) prevents the heat transmission between the exhaust and supply air. The bypass works automatically.

2.1.8 Common Operation with fireplaces

The installer has to comply with the corresponding standards and regulations in case of synchronous operation with fireplaces, e.g. fireplace. The common operation of heat-producing appliances and ventilation systems dependent on the indoor air requires a suitable safety device (differential pressure switch) or a plant-specific device, when a dangerous negative pressure builds up in the installation room of the heat-producing appliance during the operation. The focus is prepared for the common operation with fireplaces.

2.2 Available Control Units

The novus can be equipped with the following control units:

- LED control panel
- TFT Touchpanel
- Boost ventilation switch

2.2.1 LED Control Panel

Key - supply air and extract air mode

Key – only extract air mode

Key – only supply air mode

Key – fan speed down

Key - fan speed up

Key - boost ventilation

Reset key – filter change period

Figure 2: Key assignment for LED control panel

2.2.1.1 Display of the Operation and Failure Conditions

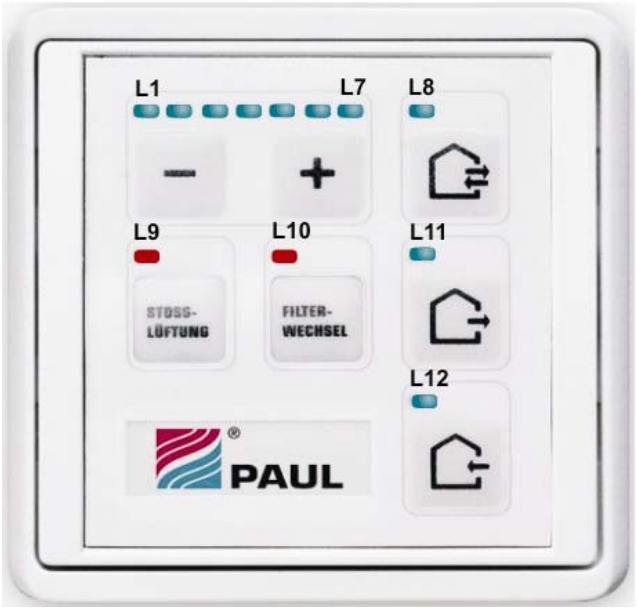


Figure 3: LED-display of the LED control panel

Display	Function / Meaning
L1 ... L7 lamp display	LED lamp display no LED = fan speed 0 (fan off, standby) 1 LED (L1) = fan speed 1 2 LEDs (L1+L2) = fan speed 2 ... etc. 7 LEDs (L1+…L7) = fan speed 7
L1 + L7 glow	No external release: fan off
L8 glow	Supply air and extract air mode
L8 flashes	Error (sensor or frost protection): fan off, bypass closed
L8 + L10 flash	Configuration mode upper temperature threshold of bypass (Display only during the configuration phase)
L8 + L11 + L12 flash	Common error, the error number is displayed binary with the LEDs L1 to L7, see (Table 5 in chapter 3.9 Visualisation of Errors with the LED Control Panel)
L8 + L12 glow + L11 flashes 2x and then stays turned off	Configuration mode for joint operation with a heat-producing appliance (Display only during the configuration phase)
L9 glows	Boost ventilation mode
L10 glows	Pre-selected filter run-time has run out
L10 flashes	Pre-selected filter run-time will run out in less than 10 days
L10 + L12 flashes	Configuration mode imbalance for the selected fan speed (Display only during the configuration phase)
L11 glows	Extract air mode
L11 flashes	Extract air fan has failed: fan off, bypass closed
L11 briefly flashes 3x	Extract air mode deactivated (key “only extract air mode“ is blocked, configuration for joint operation with heat-producing appliance is active)
L12 flashes	Supply air mode
L12 flashes	Supply air fan has failed: fan off, bypass closed

Chart 1: Assignment of functions of the LED displays

2.2.1.2 Description of the Control Functions with the LED Control Panel

2.2.1.2.1 Setup of the Operating Mode

The keys , , permit to set up the operating mode. The active operating mode is visualised by means of the respective LED of the operating mode key.

2.2.1.2.2 Fan Speeds

The keys / permit to select 7 fan speed. The current fan speed is displayed by means of a LED lamp (L1 ... L7) up to selected speed inclusively.

2.2.1.2.3 Boost ventilation Mode

With the key , the current ventilation mode is started with fan speed 7 for the duration of 15 minutes in the operating mode supply air and extract air operation. After the time for boost ventilation has expired, the control system activates the operating mode which has previously been preset. By means of the actuation of another functional key, the boost ventilation mode can be terminated at any time. The visualisation of the boost ventilation mode is realised by means of the flashing of the entire LED lamps and the LED L9 of the key .

2.2.1.2.4 Filter Change

For the cyclic checking of the filters, an operating hours counter is integrated in the control system. The flashing LED L10 above the key indicates that the remaining run-time of the filters has elapsed. In case of a remaining run-time of the filters of less than 10 days, L10 briefly flashes at intervals of 3 sec.
After carried out filter check and filter change, if necessary, the run-time of the filters is reset by pressing the key for at least 3 sec. The LED L10 goes out.

2.2.1.2.5 Configuration Mode for Joint Operation with a fire place

After the pressing of the key combination and for at least 3 sec, the key and therewith also the operating mode „only extract air mode“ for the joint operation of the ventilation device with a fire place is deactivated permanently. The modification is indicated by means of the LED's L8+L11+L12, whereas L8 and L12 are switched on and L11 flashes 2 times and then remains turned off. This indication is only visible, if the key combination is held down. An actuation of the key in the deactivated state results in a short, 3fold flashing of the respective LED in order to indicate the suppressed condition.

A repeated pressing of the key combination and for at least 3 sec results in the unlocking of the keys. The modification is again indicated by the LED's L8+L11+L12, whereas L8 and L12 are switched on and L11 flashes 2 times and then remains turned on. Also this indication is only visible, if the key combination is held down. With this, the operating mode "only extract air mode" is enabled again.

Always push this button ***first!***

The button ***has to be deactivated permanently, if the ventilation device is operated by means of a fire place! The joint operation of the ventilation device and the fire place makes heightened safety-related requirements necessary. For the contemporaneous operation with fire place, there is an additional module for the monitoring of the negative pressure with a switch-off function for the ventilation device and/or the extractor hood with exhaust air connection.***

2.2.1.2.6 Configuration Mode Upper Temperature Threshold of Bypass

After the pressing of the key combination FILTER-WECHSEL and for at least 3 sec, the LED's L8 and L10 are flashing.

With the keys + and − , only the upper temperature threshold for the opening of the bypass can be adjusted in dependency on the exhaust air temperature between 21°C (LED L1) and 27°C (LED L7). The lower threshold has a fixed pre-set value of 18°C.

After the repeated actuation of the key combination and FILTER-WECHSEL for at least 3 sec, the adjusted value is transferred and the configuration mode upper temperature threshold of bypass is closed.

Always push this button FILTER-WECHSEL ***first!***

2.2.1.2.7 Configuration Mode Imbalance

By pressing the key combination FILTER-WECHSEL and for at least 3 sec, the configuration mode imbalance is activated, and the LED's L10 and L12 are flashing. With the keys + and − , the imbalance of the fan speed which is active during the activation of the configuration mode can be adjusted in steps of 5%. The adjustment of the imbalance of each fan speed is not effected separately, but in a combined manner for groups of fan speeds: group fan speed <1+2>, group fan speed <3+4+5> and group fan speed <6+7>. The LED'S L1 to L7 indicate the selected imbalance. The adjustable range is between -15 % (L1) and +15 % (L7). In the central position (L4), the supply air fans and the exhaust air fans are running with the same rotation speed. After the repeated actuation of the key combination FILTER-WECHSEL and , the adjusted value is transferred and the configuration mode imbalance is closed.

Always push this button FILTER-WECHSEL ***first!***

2.2.1.2.8 Configuration of Frost Protection

The frost protection for devices with LED control panel complies with the frost protection mode "safe" and is configured in compliance with the type of the device. If the outside air temperature falls below < -0.5 °C (type of device: novus 300) or < -7.5 °C (type of device: novus F 300), or if the supply air temperature falls below < 4.5 °C (applies to both device types), the supply air fan and the exhaust air fan are switched off, start again after one hour and run for 2 min. If one of the possible thresholds is still undershot after this, the process is repeated.

2.2.2 TFT Touchpanel

Figure 4: TFT Touchpanel with stainless steel frame

The 3.5 inch TFT display of the Touchpanel comprises 320x240 pixels and can be operated by touching it with the fingers (touch screen).
In the upper status line of the start screen, the time, the respective menu speed in the form of a headline, as well as the remaining run-time of the filter, which is currently existent, are indicated. Directly below this line, the eight basic functions of the ventilation device and the respective icons are represented in 2 lines. On the left side of the footer, a help function is implemented, in the middle a so called short help text can be found, and on the right side of the footer, a keypad lock is implemented.

2.2.2.1 Description of the Operating Functions with the TFT Touchpanel

2.2.2.1.1 Description of the Operating Functions of the Main Menu

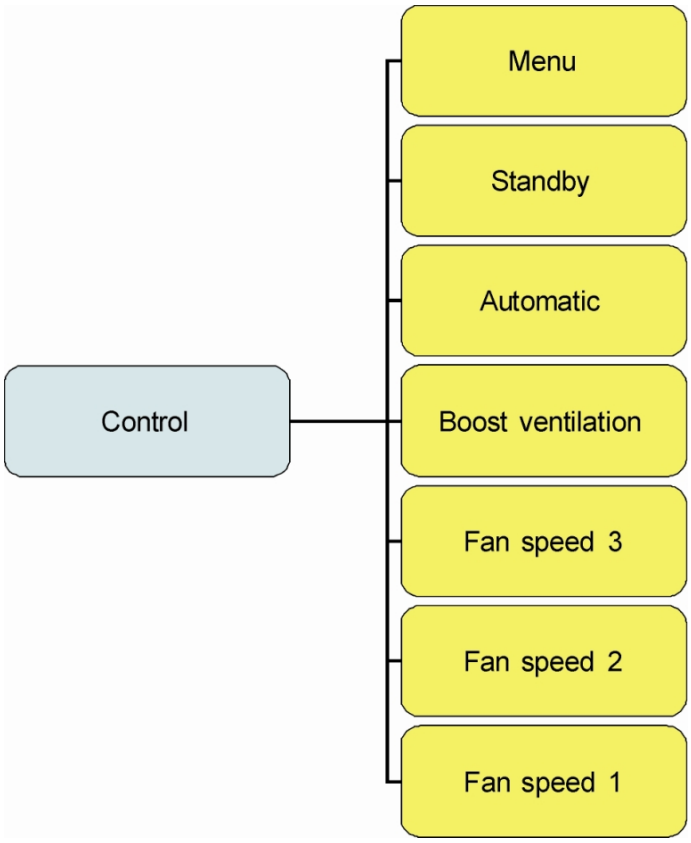


Figure 5: Menu structure of the main menu

Figure 6: Start screen of the Touchpanel

Fan speed 1: Smallest permanent fan speed.

Fan speed 2: Intermediate permanent fan speed.

Fan speed 3: Biggest permanent fan speed.

Boost ventilation: The boost ventilation mode activates an automatic timing program, in which the fan speed 3 is activated for a duration which can be preset (standard: 15 minutes). After this, the device switches back to the previous ventilation state.

Un-occupied: When leaving the house, a reduced ventilation function can be adjusted by activating the function “un-occupied“. When returning, a repeated actuation of the key switches the ventilation device back to the previous ventilation state.

Automatic mode: The automatic mode describes a timing program which temporarily deactivates the manual settings. Here, different fan speed (0, 1, 2 or 3) can be deposited for each day of the week with a cancellation interval of 15 minutes. This “fan speed week profile” can be individually configured and adjusted in the menu speed menu/settings.
Automatic sensor regulates the fans according to a linear characteristic curve which can be preset in dependency on an analogue sensor indoor air quality sensor (also combined CO_2, humidity and temperature) which is connected to the master.

Menu: Via this key, the information, settings and setup menu is accessed.

Standby: With the standby function, the ventilation device is switched to an energy-saving mode. The display turns dark, but the touch pad of the touch panel remains active in order to “wake up“ the system. It is sufficient to simply touch the touch pad in order to terminate the standby mode.

Enter: By means of the enter key, it is possible to navigate in the different submenus, and changed data are transferred to the memory.

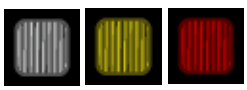
Termination/back: By means of the termination key, it is possible to change from one menu to the next higher menu speed without transferring data which possibly have been changed.

Help: By means of the help key at the bottom left, it is possible to pass to a context-sensitive help menu. If this key is grey, no help text is deposited.

Key button: If the key button is touched, the TFT touch pad is locked against touch, with the exception of the area of this button. This function can be used for cleaning purposes. If the button is pressed again and held down (approx. 2-3 sec), one passes back to the initial menu.

Calendar symbol: In the menu/settings/automatic timing, the calendar day or days for which one wants to adjust the fan speeds can be selected by touching the calendar symbol. Just like in the main menu, the fan speeds themselves are indicated in grey at the left margin, but at a smaller scale. The fan speed to be adjusted is activated after being touched and can then be transferred for the single ¼ hours by means of the enter key.

Error signal: A flashing yellow warning triangle at the right upper margin indicates an error. Under menu/information/error indication, the error can be read in plain text.



Filter symbol: In the right upper corner of the main menu, a filter symbol is indicated, and directly below it, the remaining run-time of the filter is indicated in days. When the remaining run-time of the filters has expired (0 d), the colour of the filter symbol changes from grey to yellow. If the remaining run-time of the filters is exceeded by 10 days without the filters being changed (-10 d), the colour of the filter symbol changes from yellow to red.

Key +/-: With the keys +/- , values can be changed in the individual menus (e.g. fan speeds in steps of 1%, or the time in minute or hour steps). **Important:** The data are only transferred, if the enter key is pressed.

Navigation keys: The navigation keys left/right and up/down can be used to navigate in the selection menus in order to reach the selected submenu by pressing the enter key. If several values are adjustable (e.g. with date and

time: day, month, year, hours, minutes), individual values, which are to be adjusted, can be reached and modified using +/-.

Modified data is no sooner applied as the enter key is pressed.

2.2.2.1.2 Description of the Operating Functions of the Submenu

Three submenus are available:

- Information
- Settings
- Setup

2.2.2.1.2.1 Information Submenu

The submenu **information** visualises various parameter of information and setup as well as chosen factory presets (e.g. type of device).

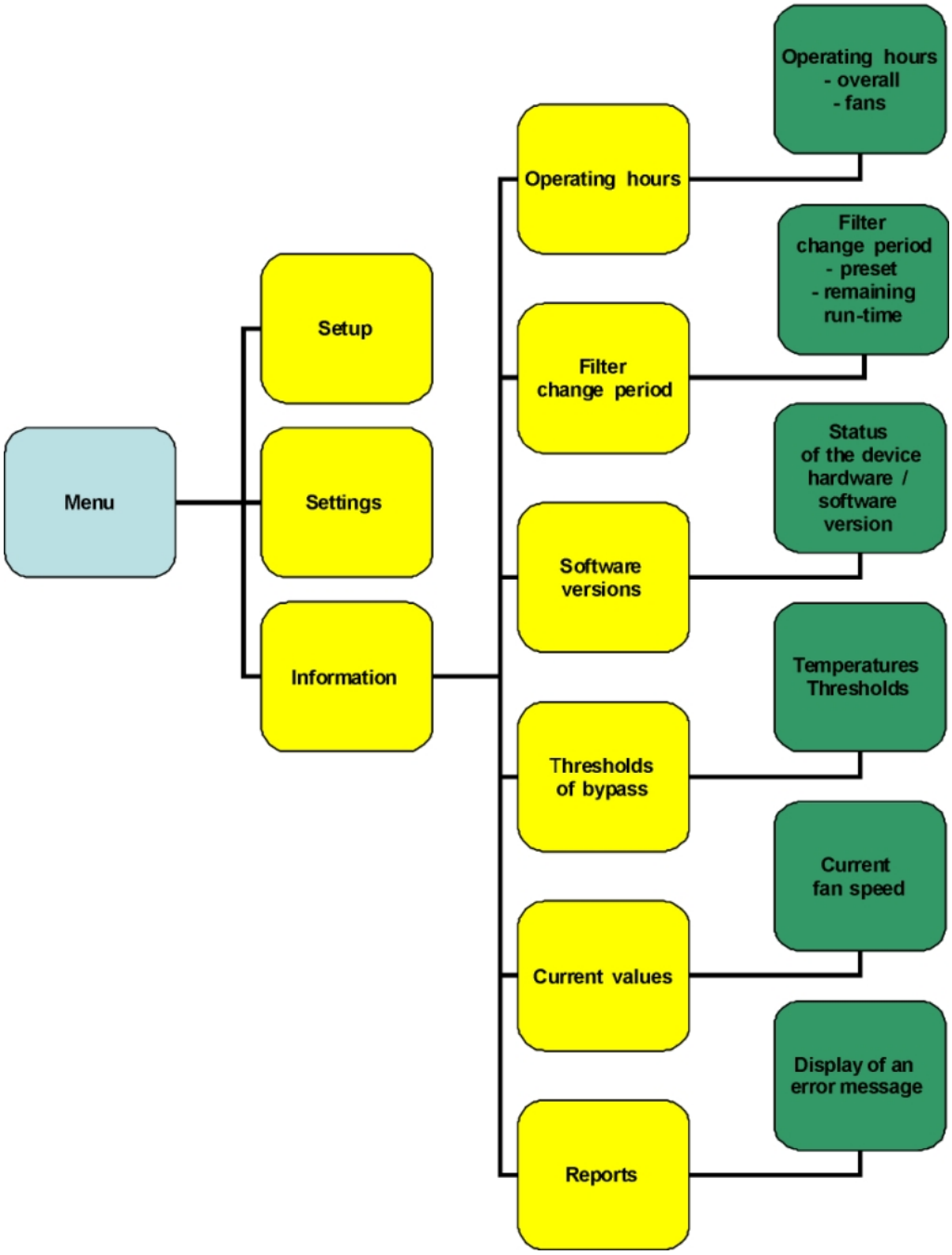


Figure 7: Menu structure of information submenu

Operating Hours
Here, the total operating hours of the ventilation device and the fan operating hours (e.g. the hours, during which the fans were actually running) are indicated.

Filter change period
Here, the preset filter run-time and the current remaining run-time of the filter are indicated.

Software versions
Here, the type of device, as well as the hardware and software status of the controllers are indicated which are involved in the control process.

Thresholds of bypass
Here, the upper and lower temperature thresholds of the bypass are indicated. Below the lower and above the upper temperature threshold, the bypass remains closed.

Current values
Here, the percentaged adjustments of the three fan speeds LS1...LS3 as well as the preset times for absent and intermitting ventilation are indicated.

Reports
Here, a possibly occurring error is indicated in plain text. In case of various errors which occur at the same time, it is always the one with the highest priority which is indicated.
In addition to this indication, a yellow warning triangle is flashing at the right upper margin of the screen.

2.2.2.1.2.2 Settings Submenu

The **settings** are intended for manipulation on the part of the user and mainly serve for the individual adjustment to the own comfort.

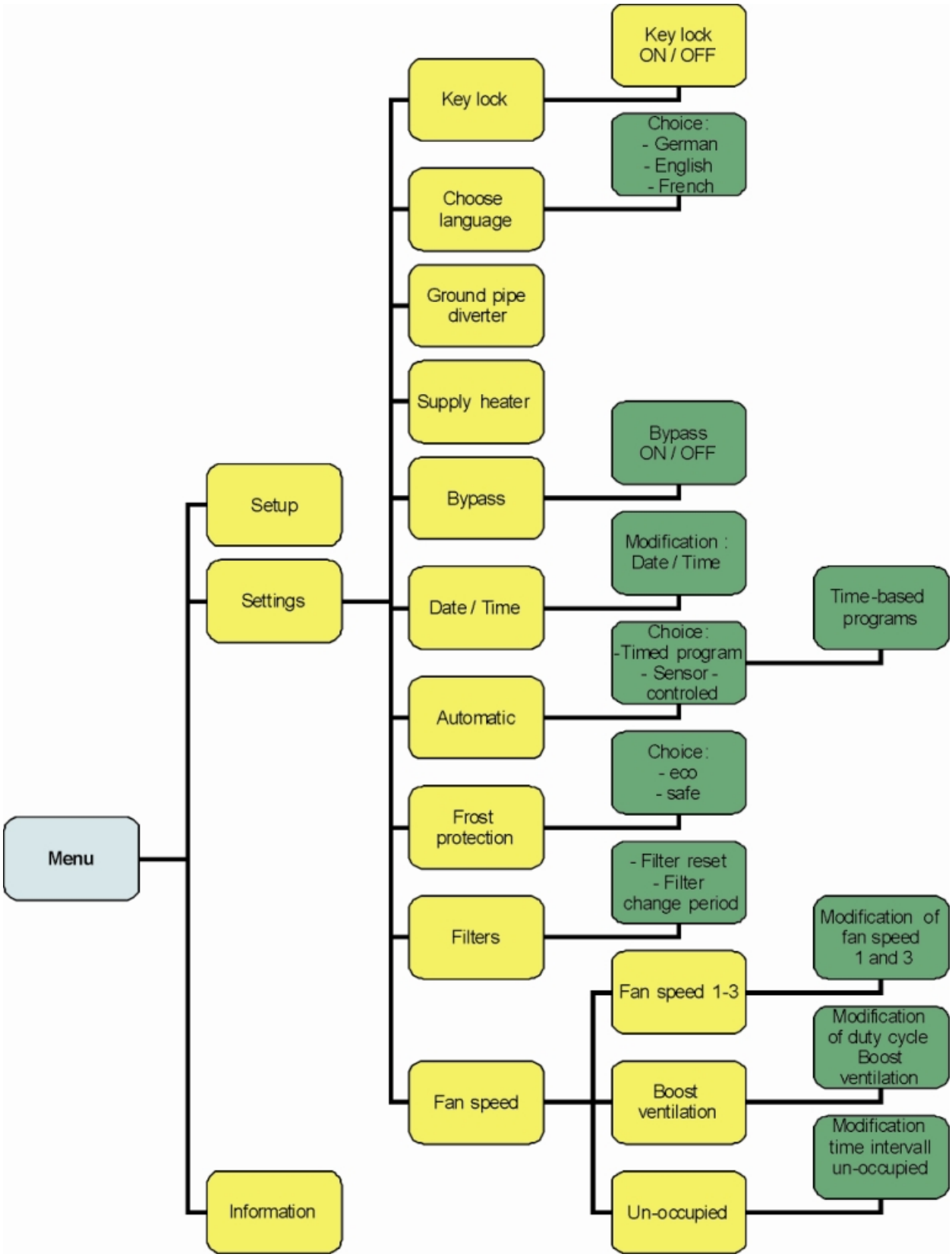


Figure 8: Menu structure of settings Submenu

Key lock
The operation of the TFT Touchpanel can be locked with the help of a preset password menu. The device can be operated no sooner with the help of the TFT Touchpanel as the password is entered again. The password for the key lock is: <11111>

Choose language
Menu is currently not available.

Ground pipe diverter
A motor-controlled flap which is temperature-controlled closes an optionally existent geothermal heat exchanger and opens the string of the direct outside air inlet. In this menu, the respective temperature thresholds for the opening and closing of this flap are adjusted.

Supply heater
An optional universal thermostat can be used for the supplementary heating of the supply air which flows out of the heat exchanger into the room. The supplementary heating device can be either released or locked with the help of this menu.

Bypass
The exhaust air temperature thresholds of the bypass flap can be adjusted here. The operation of the summer and winter bypass can be permitted or prevented.
An upper and a lower threshold are entered in this menu:

- Upper threshold x_exh_max 20 °C…30 °C (exhaust air)
- Lower threshold x_exh_min 13 °C…20 °C (exhaust air)
- Hysteresis: 0.5…3.0 K

The bypass opens above the upper and closes below the lower threshold if permitted by the outside temperature conditions.

Date / Time
Date and time are adjusted in this menu.

Modified data / times have to be confirmed with in order to be saved.

Automatic
Two automatic operating modes are designated:

- Automatic timing
- Automatic sensor

An individual fan speed for each quarter of an hour of each weekday is determined by the operating mode automatic timing. A weekday (Monday…Sunday) or a group of weekdays is chosen by pressing the calendar key.
This fan speed is preset by tapping a fan symbol at the left margin (recognisable by the fan speed symbol changing to blue). The initially black cursor at the upper margin of this setting menu changes to orange and assigns the preset fan speed to the next quarter of an hour.

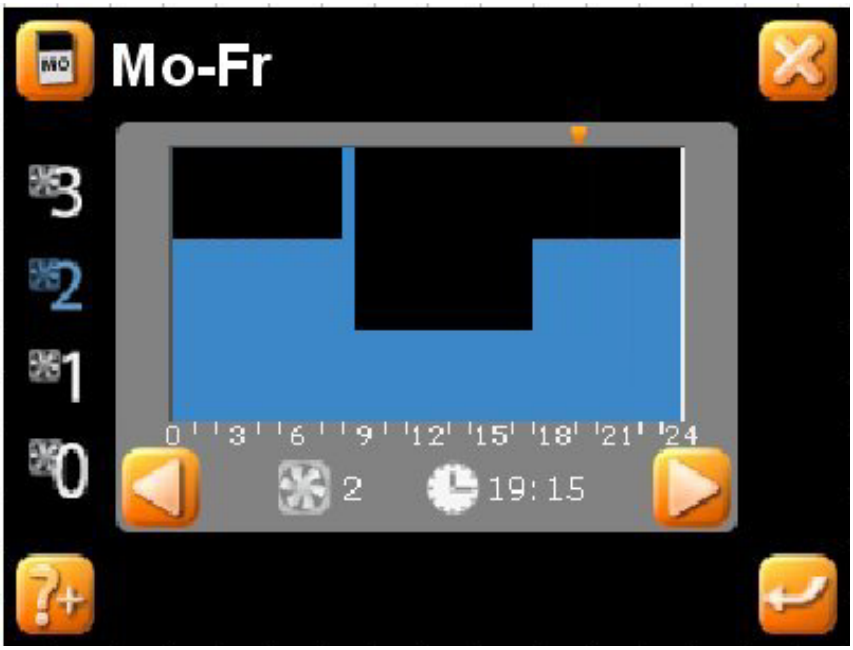


Figure 9: Screen display of factory presets: group of weekdays Monday to Friday

By selecting a group of days (e.g. Monday-Friday), the modified data is assigned to each day of the group. The settings for the group "Monday-Friday" are thus identical with the days "Monday", "Tuesday"... "Friday" (and the group "Saturday-Sunday" is identical with the days "Saturday" and "Sunday" respectively). The profile of the respective day ("Monday"…"Sunday") has to be changed in order to use other fan speeds and times for a single day! Subsequent modifications of "Monday-Friday" and "Saturday-Sunday" respectively overwrite the previously made settings of a single day once again!

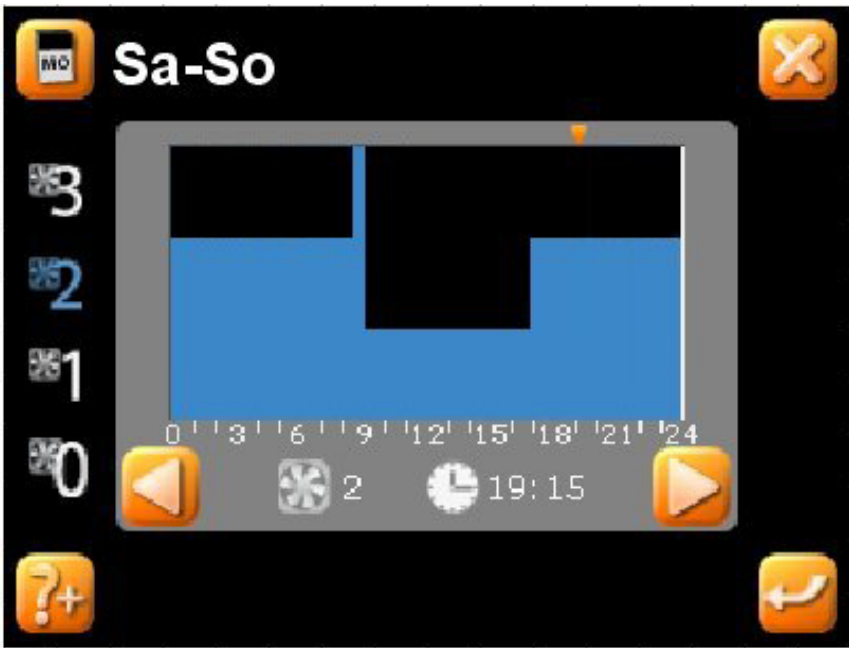


Figure 10: Screen display of factory presets, group of the weekdays Saturday-Sunday

The modified data can be saved with the help of the enter key. The screen is dark for a short time while the modified data is saved.

Group of Weekdays	Time Slot	Fan Speed
Monday-Friday	0.00 am - 8.00 am 8.00 am - 8.30 am 8.30 am - 4.00 pm 4.00 pm - 0.00 am	Fan speed 2 Fan speed 3 Fan speed 1 Fan speed 2
Saturday-Sunday	0.00 am - 8.30 am 8.30 am - 9.00 am 9.00 am - 0.00 am	Fan speed 2 Fan speed 3 Fan speed 2

Table 2: Overview of the automatic timing of the factory presets

The factory presets of the automatic timing can only be reactivated in the setup submenu.

The analogue signal of an air quality sensor, CO_2 sensor or humidity sensor is interpreted as a control signal for the fan rotary speed after a respective transformation in the operating mode **automatic sensor** has taken place. First, it is set if the sensor has a current or a voltage output (current: 4…20 mA, voltage: 0…10 V).
Afterwards, the upper and the lower point of a characteristic curve, which is supposed to be linear, is parameterised.

Frost protection
The temperature threshold of the active frost protection is selected here between "safe" and "eco". The mode "safe" is able to safely prevent the freezing. However, more energy is spent than when using the mode "eco".
The mode "eco" is able to prevent freezing during almost the entire operation.

Filters
The filter run-time can be set here. An internal timer daily resets the remaining run-time of the filters by one day. After a filter change has been carried out, the remaining run-time of the filters can be reset to the value of the preset filter run-time.

Fan speed
The fan speed 1 and 3 can be set here in one percent steps between 17%...100%. Furthermore, the times for the fan speeds “un-occupied“ and “boost ventilation” are preset here.

2.2.2.1.2.3 Setup Submenu

The **setup** is only carried out by the service technician. Therefore, it is protected by a password.

2.2.3 Boost ventilation switch

The boost ventilation mode can be activated by means of one or more external boost ventilation switch. This boost ventilation switch is usually mounted in extract air rooms like bathrooms, toilets or kitchens in order to drain excessive moisture and odours off as quick as possible. If this switch is activated, the functional properties and visualising displays described in 2.2.1.2.3 Boost ventilation mode with the LED Control Panel and 2.2.2.1.1 Boost ventilation with the TFT Touchpanel respectively are generated.

2.3 Maintenance by the User

Being the user, you have to maintain the ventilation system and especially the novus as follows:

- Cleaning or changing of the filters
- Cleaning of the valves (at home), cleaning of the header filter

If the maintenance works are not (regularly) performed, the functionality of the comfort ventilation will be affected in the long term!

2.3.1 Cleaning or Changing of the Filters

The maintenance of the device and the system by the user is limited to a periodical change of the filters and the cleaning of the supply air valves and the exhaust air valves. A filter change has to be carried out every 3 to 6 months according to EN DIN 1946-10. The system may not be operated without filters. The device has to be turned off if a filter change or maintenance works are performed!
Optionally check other filters of the ventilation device and change them if necessary. A change or cleaning (warm water with dishwashing detergent) of the filter mats on the exhaust air valves (e.g. bathroom, kitchen, toilet) should be carried out every 2 to 3 months or as one sees fit after checking the degree of soiling.

2.3.1.1 Changing of the Filters of the Device

High-class original PAUL filters are installed in the novus, recognisable by the imprinted PAUL logo. The filters can be directly ordered from the company Paul Wärmerückgewinnung GmbH or via www.paul-lueftung-shop.de. The filters of the novus have to be changed after a respective message is displayed on the operator unit. Thereby, proceed as follows:

1. Disconnect the device from the power supply.
2. Pull the maintenance flap **A** off the magnetic clamps of the front plate.
3. Pull the filter cover cap **B** out of the filter slide-in compartment **D**.

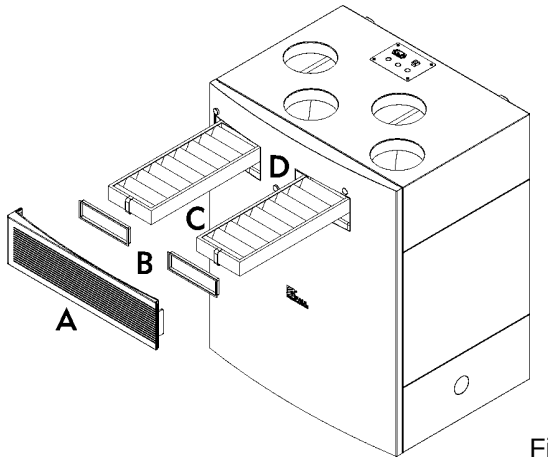


Figure 11: Filter change

4. Pull the filters **C** out of the filter slide-in compartments by means of the filter strap **E**.

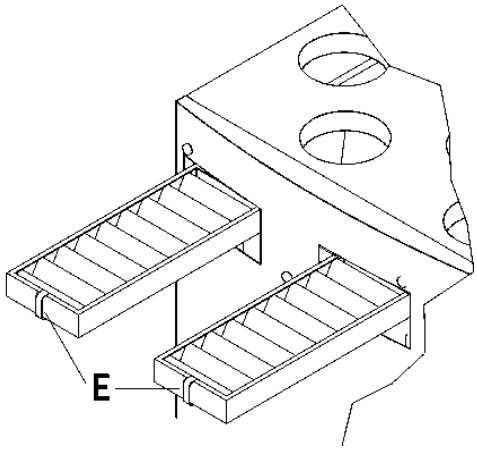


Figure 12: Filter strap

5. Push the new filters in the filter slide-in compartments with regard to the flow direction **F**. The filters are marked with an arrow ↓ according to the required flow direction.

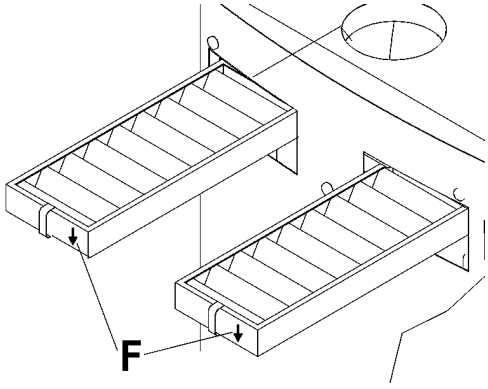


Figure 13: Filter flow direction

6. Seal the filter slide-in compartments with the filter cover caps.
7. Push the maintenance flap with the guide surface in the slot of the front panel until the magnetic clamps lock.
8. Restore the network connection.

Pollen filters are to be inserted in the filter slide-in compartment of the outside air connection depending on the device version (see identification plate)!

(See tag for the connection of the air ducts, marked with the symbol

)

LEFT version - right filter slide-in compartment
RIGHT version - left filter slide-in compartment

2.3.2 What to Do in the Event of a Failure?

Please contact the installer immediately in the event of a failure. Make a note of the error display and the failure code respectively. Also make a note of the type of your novus (see identification plate on the surface of the device).
The network connection has to be present at all times except for the novus being shut down because of a serious failure, the cleaning or changing of the filters or another compelling reason.

As soon as a power disconnection has been performed, the living space is not mechanically ventilated anymore. This may cause moisture and mould problems in the living space. Therefore, the long-term shutdown of the novus has to be avoided!
The ventilation system has to be operated continuously according to DIN 1946-6 except for the times of maintenance and repair works. The system should be operated at the lowest speed during a period of absence!

2.4 Proper Disposal

Talk to your supplier about what to do with the novus at the end of its life time circle. If you cannot return the novus, do not put it to the ordinary household garbage, but ask your local authorities for ways of a re-use of components or the environmentally friendly processing of the materials.

3 Notes for the Installer

This section describes how to install and commission novus.

3.1 Principal Configuration of the System

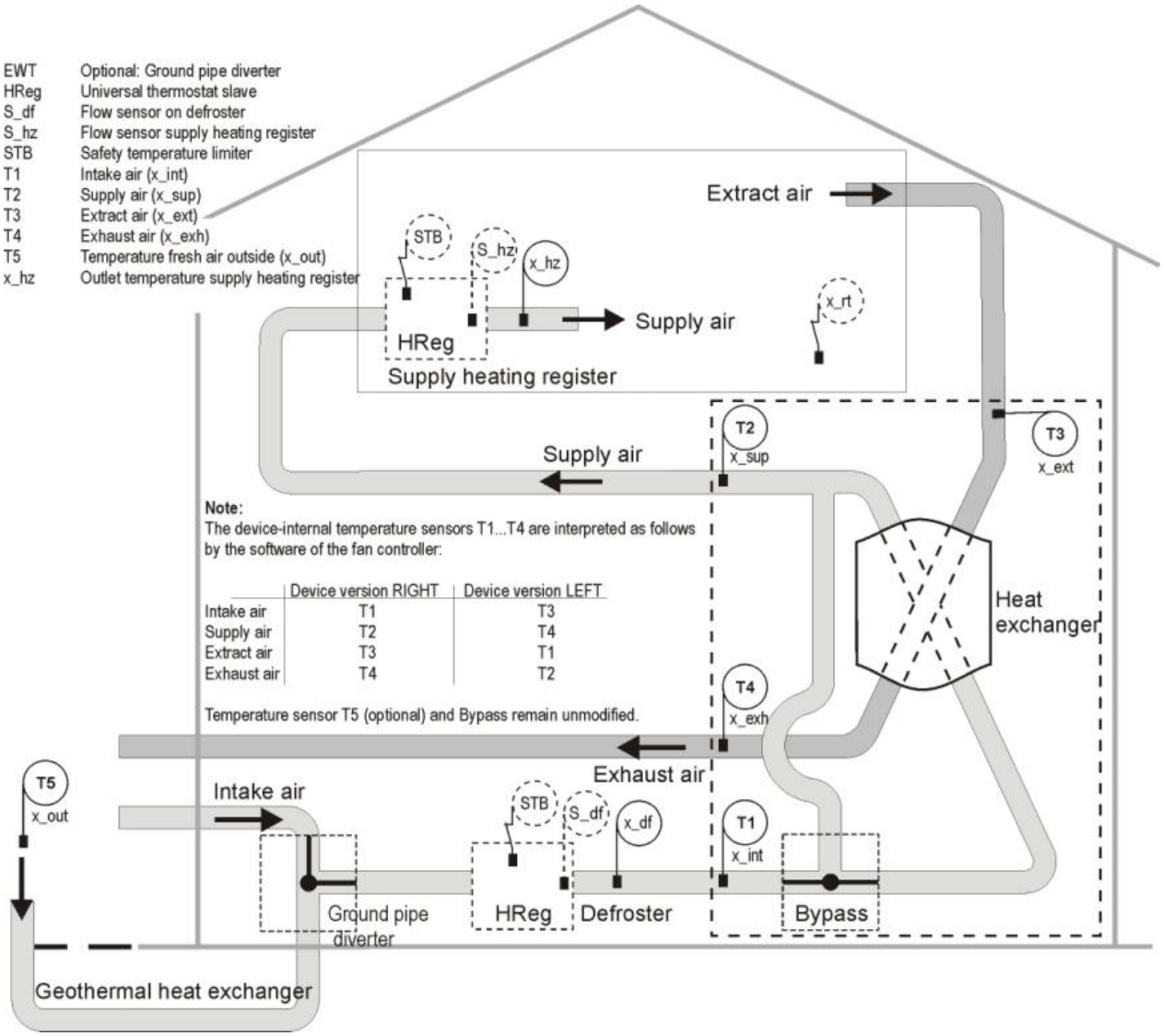


Figure 14: System outline with sensors and ventilation equipment

The principal configuration of the system has a universal character and does not represent the system outline of the project-related ventilation system! It is meant to represent the plant-specific system structure of sensors and ventilation equipment.

3.2 Configuration of the novus

The novus consists of the following standard parts:

- Housing **A** made of coated sheet steel
- Internal space **B** made of first-class expanded polypropylene (EPP)
- Maintenance flap **C**
- Front panel **D** made of dyed plastics
- Two filters **E** for the cleaning of the air

- Two filter cover caps **F**
- Tightly closing motor bypass flap **G**
- Bypass flap covering **H**
- Highly efficient reverse flow channel heat exchanger or a membrane moisture heat exchanger **I**
- Two high capacity fans with constant speed **J**
- Heat exchanger covering **K**
- Foam cover plate for the fans **L**
- Control boards **M**
- Plastic cover plate for the control **N**
- Interface sheet **O**

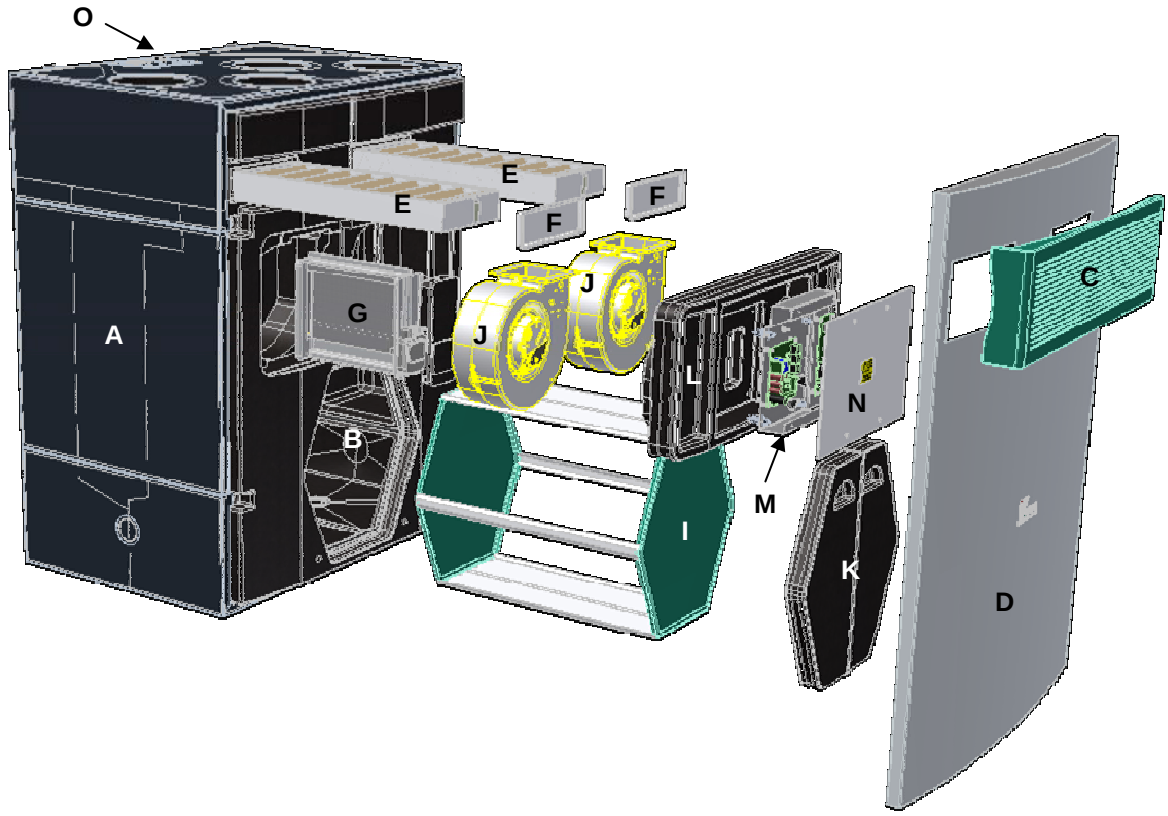


Figure 15: Exploded view of the main components

3.3 Installation Requirements

In order to be able to judge if it is possible to install the novus in a certain room, the following points have to be observed:

- Novus has to be installed in accordance with the general as well as the local safety and installation instructions of the electric works and water works among others as well as according to the instructions of this operating manual.
- The place of the installation has to be selected in such a way that there is enough space at the sides of the novus for air connections and for performing maintenance works.
- The following equipment has to be available in the installation room:
  - air duct connectors.
  - 230 V power supply.
  - connectivity for the condensate drain.
- Novus has to be installed in a frost protected room. The condensate has to be drained off frost-free, with a gradient and by using a siphon.

3.4 Installation of the novus

3.4.1 Transportation and Unpacking

Be careful when transporting and unpacking the novus.

The package has to be removed only immediately before the mounting of the device!

The open ends (stubs) have to be protected against dust and moisture before and during installation interruptions!

3.4.2 Checking of the Scope of Delivery

If you detect any damages or incompletion to/of the delivered product, please contact the supplier immediately. The scope of delivery includes:

- novus; check the identification plate in order to make sure that it is the right device (type / version / design)
- Mounting sheet with 2 pieces of self-adhesive rubber buffer
- 230 V power cable with IEC power connector
- Cat-5 cable
- Operating manual

3.5 Mounting of the novus

The novus has to be mounted according to its design (HORIZONTAL or VERTICAL). Check the required load capacity of the wall construction (dead load of the novus: 50 kg) and the safe mounting option of the mounting sheet when mounting it to a wall. We recommend the usage of the mounting frame (available as an option) for the installation on the floor if the walls are unsuitable. That way, potential transmissions of structure-born noise are avoided as well as it can be.

3.5.1 Wall Mounting

Ensure that a minimum clearance of 1 meter remains in front of the novus for subsequent maintenance works.

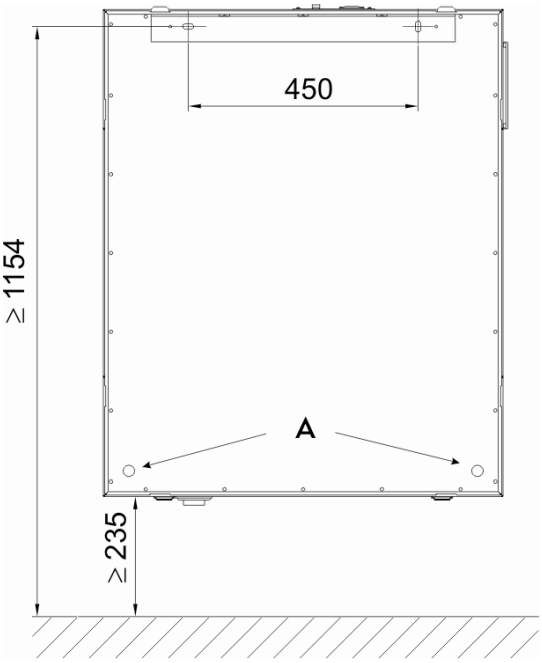


Figure 16: Vertical wall mounting
(Example: RIGHT version of the novus)

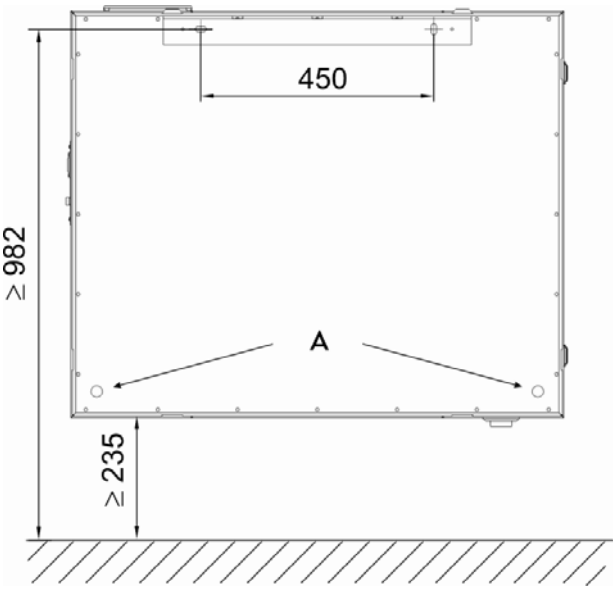


Figure 17: Horizontal wall mounting
(Example: HORIZONTAL version of the novus - RIGHT)

- Mount the delivered mounting sheet with the lugs, which point upwards, horizontally to the wall with regard to the minimum distances of the types of mounting.
- Glue each piece of the enclosed, self-adhesive rubber buffer **A** in the bottom corner region on the rear panel of the device as shown in Figure 15 and Figure 16.
- Hang the novus on the mounting sheet by hooking the lugs in the slot openings each of which are situated at the top of the fold of the rear panel.

3.5.2 Mounting on a Mounting Frame

Ensure that a minimum clearance of 1 meter remains in front of the novus for subsequent maintenance works.

The area of the mounting frame has dimensions of 620 x 480 mm and a height of 255 mm. Individual parts, which have to be put together on site, are delivered.
Mount the individual parts of the mounting frame in accordance with the figures. Thereby, proceed as follows.

- The mounting frame consists of two long and two short side parts.
- Both of the long side parts have a nut which is situated at the corners of the side parts for receiving the height adjustable feet.
- Connect the side parts of the mounting frame according Figure 18 and to the sectional view in Figure 19 and Figure 20.

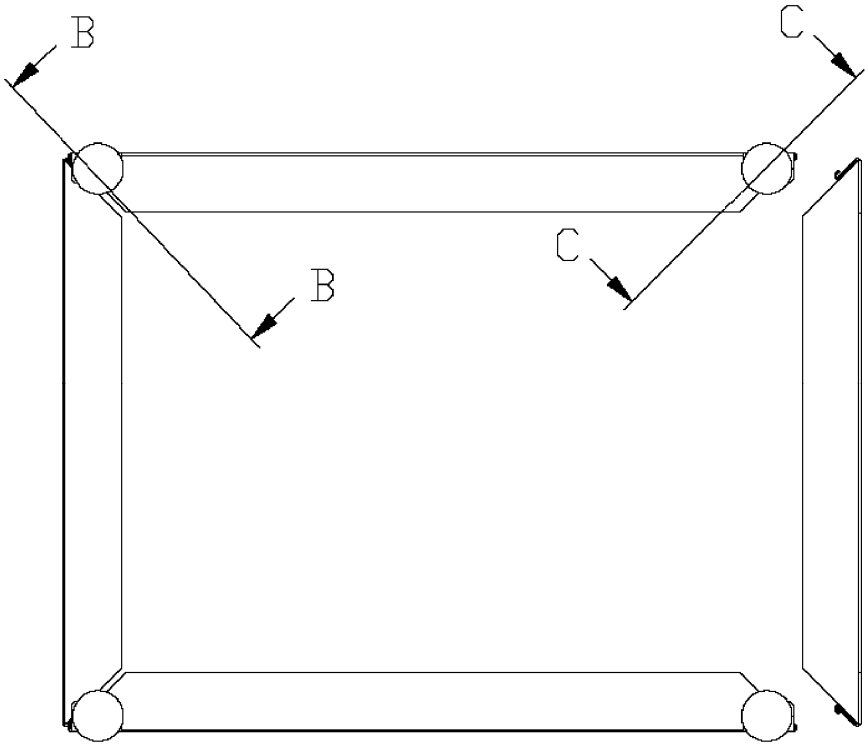


Figure 18: Side part of the mounting frame

- The short side parts with the lugs **D** are to be hooked in the guiding slots **A** of the long side parts.

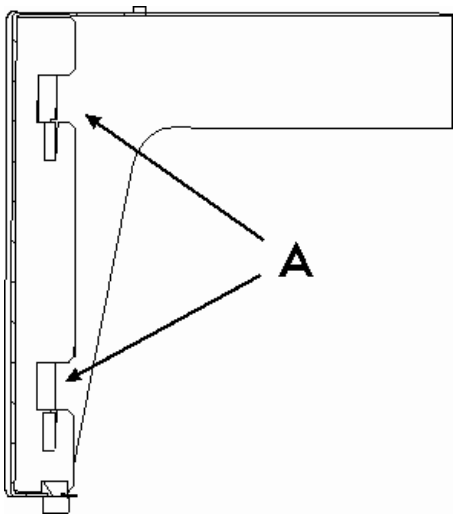


Figure 19: Detail of sectional drawing B-B

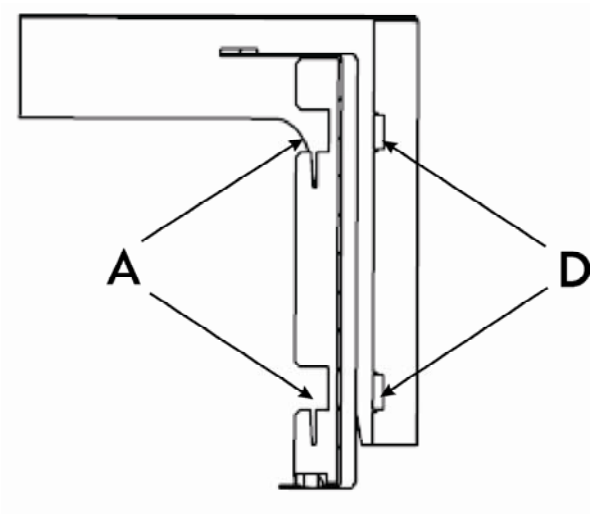


Figure 20: Detail of sectional drawing C-C

- Thereby, the short side part has to be slid in the designated guiding from above perpendicular to the long side part.
- Mount the mounting sheet **E** with the lugs, which point upwards, to a long side part of the mounting frame **F**. In doing so, screw both of the sheet metal screws in the designated bore holes **H** of the side part.

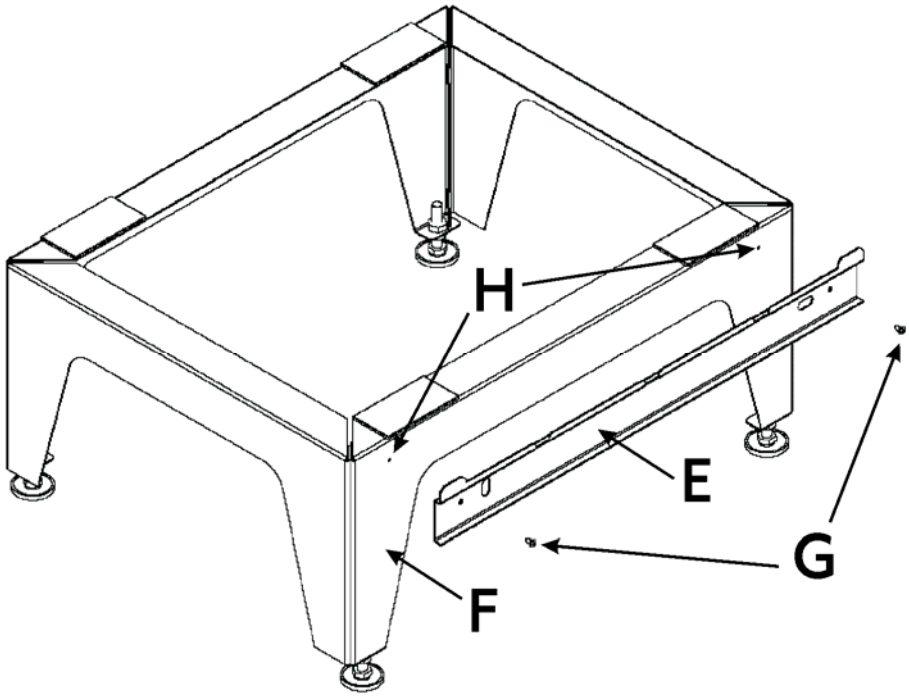


Figure 21: Screwing of the mounting sheet to the mounting frame

- Now adjust the completed mounting frame perpendicularly and stably to the designated floor space via the height-adjustable feet of the mounting frame.
- Put the novus on the mounting frame by hooking the lugs in the bottom slot openings of the rear panel.

3.5.3 Connection of the Air Ducts

Observe the following points when mounting the air ducts:

Figure 22: Tag of the connection of the air ducts

- Mount the air duct types of the ventilation device to the connector stubs in accordance with the present LEFT or RIGHT device version (see tag next to the identification plate).
- In order to ensure an easy maintenance, the air duct connections should be made directly at the device with flexible air hoses. Flexible hose mufflers with a diameter of 160 mm are recommended in order to grant a good sound absorption.
- Mount the air ducts (minimum diameter of 160 mm), which have to be connected, with the least possible air resistance and airtight.
- The basic function of the comfort ventilation system is granted if only air duct material of the company Paul Wärmerückgewinnung GmbH is used when using flexible air ducts.
- The intake air ducts and the exhaust air ducts have to be insulated vapour-diffusion tightly. This prevents the condensate formation at the outside of the air ducts.
- If a low cannot be avoided when laying the exhaust air duct from the exhaust air stud of the device to the wall outlet, another connector for the condensate conduction has to be connected because the exhaust air is saturated with condensate when it is cold outside and droplets deposit at the inner wall of the duct.
- If a muffler is planned on the exhaust air stub, it has to arch upwards in order to be protected from being wet by the condensate which returns from the exhaust air duct. The device should be mounted in such a way that the condensate drain can be conducted over a longer distance at a good gradient.
- If conducting the exhaust air via the roof, it has to be equipped with a double-wall or insulated roof penetration. This prevents the condensate formation between the roof boards.
- We recommend a thermal and steam-tight insulation of the supply air ducts and the exhaust air ducts in order to avoid unnecessary temperature losses during summer as well as during winter time.

3.5.4 Connection of the Condensate Drain

The warm extract air is cooled by the intake air in the heat exchanger. Thus, the moisture of the room air condenses in the heat exchanger. The condensate which forms in the heat exchanger is conducted to the siphon. The connector of the condensate drain has an external thread of 1¼ inch. It is situated at the bottom side of the novus in accordance with the respective device version.

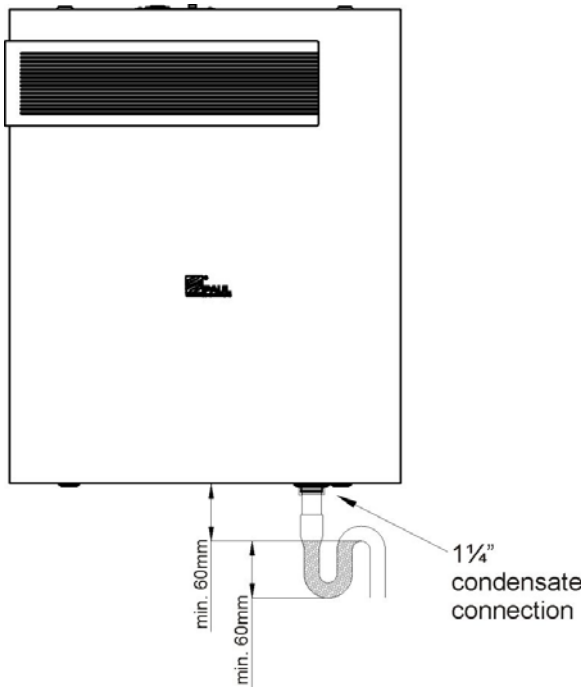


Figure 23:
Condensate connection for vertical wall mounting
(Example: RIGHT version)

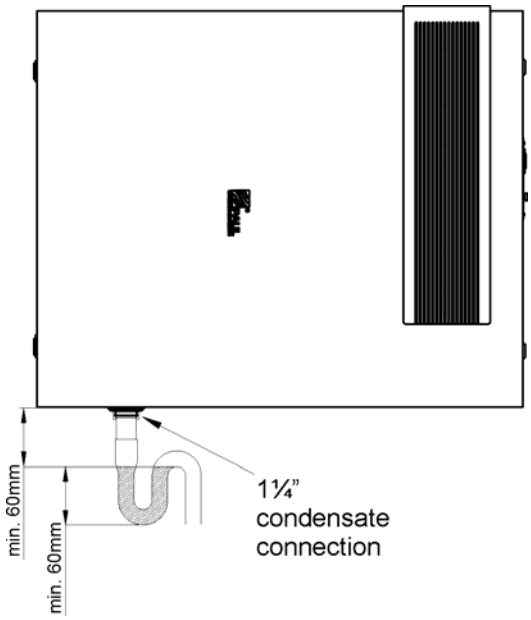


Figure 24:
Condensate connection for horizontal wall mounting
(Example: HORIZONTAL - RIGHT version)

A siphon has to be mounted to the 1¼-inch external thread of the condensate connection stub in such a way that the minimum requirements of the liquid gauge heights are met in accordance with the schematic diagram. The condensate should be able to drain freely (in a second siphon which is connected to the sewage system), so that a potentially laid drain hose (with a gradient of 5 percent) runs completely empty. The hose has to be heated if a danger of frost exists (hose heat tracing can be delivered). If a vertical or horizontal air duct is mounted to the exhaust air stub, it has to be supplied with a condensate drain at the bottom end as well.

Siphons can dry up! Water has to be refilled if:

- ***The device is commissioned***
- ***The siphon makes noises (slurping)***
- ***Odours from the sewage system can be sensed in the building***
- ***Air flows through the siphon***

The condensate drain must not be directily connected to the sewage system (e.g. finishing freely in a hopper with a siphon at the sewer).

A dry siphon is recommended! *(no limitation of the functionality if drying up)*

3.5.5 Electrical Connections

The electrical power supply of the novus is accomplished by a 3-pole plug connection of a low power device with a 2-meter long power cable. The 1.5-meter long Cat-5 cable is connected to the RS485 plug connection. Both plug connections are arranged on the surface of the device on an interface sheet connected to the housing. The interface sheet is fastened with 4 screws. The circuit diagram of the novus is represented in Appendix 1, Circuit Diagram of the novus.

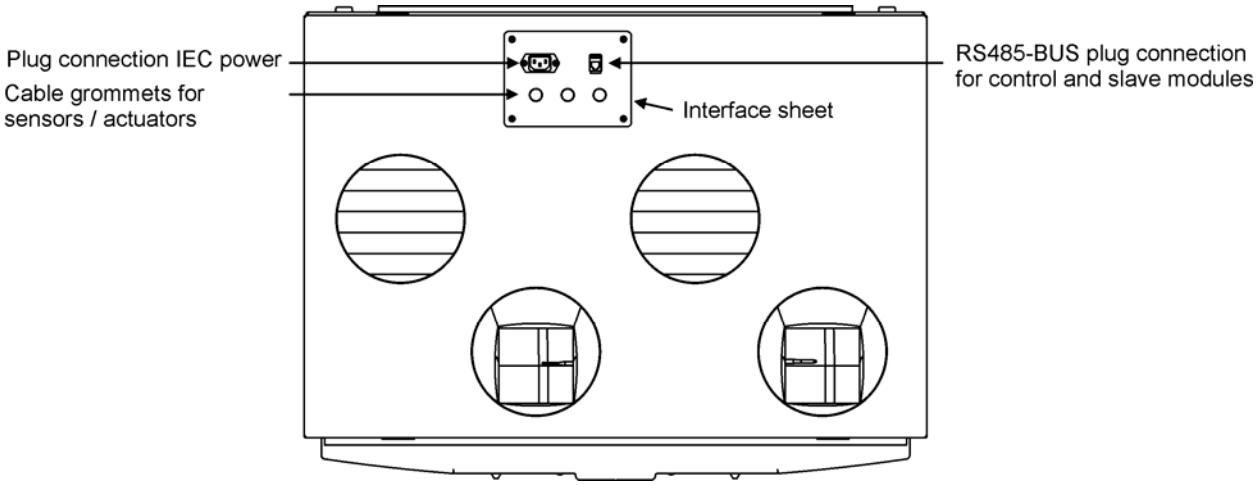


Figure 25: Electrical Connections

Analogue and digital input and output signals of sensors (e.g. room air quality sensors) or actuators (e.g. intermitting ventilation sensing devices) are applied to the through terminal which is internally connected via a 7-wire cable to the respective terminal points of the master board. The through terminal is meant to be a transfer point and is situated underneath the interface sheet. In doing so, the 4 screws have to be loosened and the cables of the sensors / actuators have to be conducted through the cable grommets which have a strain relief function. The terminal assignment of the through terminal is shown in Appendix 6 Terminal Scheme of the Transfer Point.

3.5.5.1 Connection of the Adapter Board

The adapter board, which has a dual RS485 jack and a 5-pole screw terminal, is meant to connect the control and slave modules. The Cat5 power cable establishes the internal connection between the RS485-BUS jack of the novus and any RS484-BUS jack of the adapter board.
The adapter board has to be located either close to the device or in the cable duct.

The RS485 jacks of the adapter board and of novus exclusively serve the components of the internal RS485-BUS! Any other usage results in the damage of the intrasystem modules!

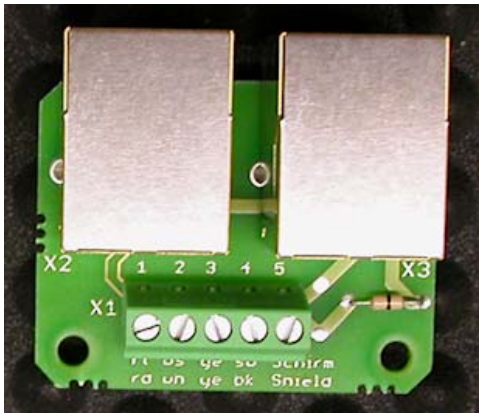


Figure 26: Adapter board

Terminal	Conductor	Signal
1	red	24P
2	white	RX
3	yellow	TX
4	black	GND
5	aluminium-coloured	Screen

Table 3: 5-pole terminal assignment of the adapter board

3.5.5.2 Connection of the TFT Touchpanel

The comfort edition of the control unit, which is a TFT Touchpanel with a stainless steel frame, is designed for an in-wall installation.

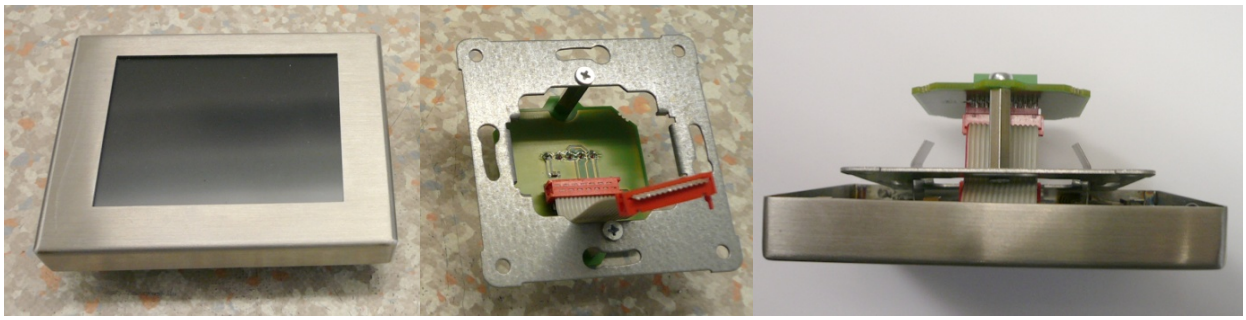


Figure 27: Control unit with stainless steel frame; in-wall base plate with control unit adapter; control unit engaged in the in-wall base plate (from left to right)

The smaller side of the stainless steel frame of the ready-made TFT Touchpanel has to point upwards. In doing so, the control unit adapter and the in-wall base plate have to be positioned in such a way that the ribbon cable of the control unit adapter, which is arched downward, is plugged in the TFT Touchpanel. The spring steel clips, which are mounted to the rear side of the control unit, grasp the in-wall base plate and pull the stainless steel frame of the control unit tightly to the wall.
The screened 4-pole telephone cable is connected to the 5-pole screw terminal of the control unit adapter. The usage of a cable of the type J-Y(ST)Y 2x2x0.6 LG indoor cable with a colour coding in accordance with VDE0815 according to Table 3 is recommended.

3.6 Commissioning of the novus

3.6.1 Operational Readiness

The operational readiness is granted if the requirements according to VDI 6022 and DIN 1964/6 are met. The cleanness of the air duct material, the existence and the proper installation of all filters, which are designated for the system, and the operational readiness of the plant-specific components have to be especially observed.

Check all security-relevant parts and perform a functional test!

3.6.2 Adjustment of the Air Volume Flow

The novus can be put into operation after the checking of the operational readiness as follows.

Make sure that the bypass is closed and all ventilation equipment is mounted.

The air volume flows of the system, which have been calculated according to DIN 1946-6, have to be adjusted with speed 2 (TFT Touchpanel) or speed 4 (LED control panel) of the ventilation device. Use an appropriate measuring device for measuring the volume flow.
Please observe that you generate via the installed valves as little pressure loss as possible, that is the supply air valve and the exhaust air valve which is flown against in the worst manner has to be fully open!

The fan speed 2 can be adjusted with the help of the TFT Touchpanel as follows:

- Menu
- Setup
- Enter password -----
- Fan speeds
- Fan setup 2 LF2

By means of pressing the buttons + or - , the set value of the system-related air volume flow is adjusted in percent according to Chart 1. If an imbalance is desired, it can also be adjusted by pressing the buttons **+** or **-** by means of the balance control fan speed 2

- by saving of the setting values
- by leaving of current menu speed

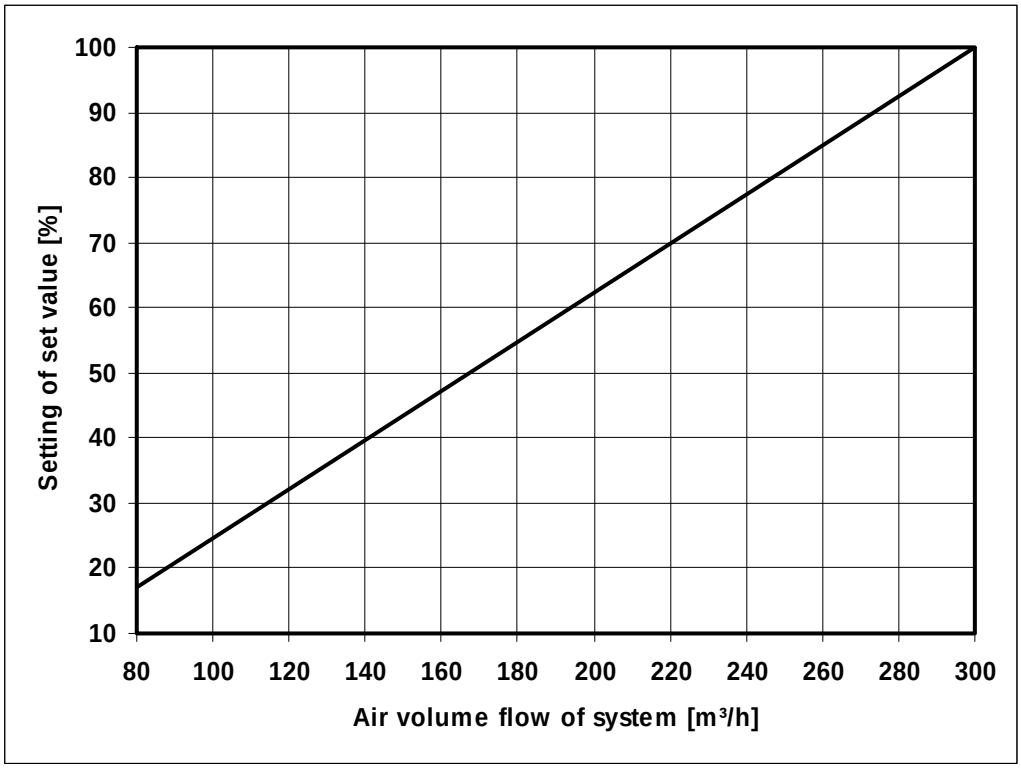


Chart 1: Setting values of fan setup 2 LF2

3.6.3 Adjustment of the Valves

- Positioning of the fans by means of the TFT Touchpanel on fan speed 2 and by means of the LED control unit on fan speed 4 respectively
- Adjustment of the air volume flows to the air valves by means of a volume flow hood and an anemometer (see air volume log)
- Adjustment of the air gap on the valve must not be too narrow – aerodynamic noises! Better: Adjustment of a lower fan output or restriction of the volume flow in the pipeline (installation of a throttle flap or throttle foam insert)
- Readjustment of the valves
- Locking of the adjusted positions of the valves and flaps
- Recording of the adjusted air quantity and all further adjustments in the designated documentations

3.7 Menu Settings by the Installer / Service Staff

3.7.1 Setup Submenu

The submenu **setup** is protected by a password. After entering the password <_ _ _ _ _>, adjustments to the respective configuration of the system can be made in the setup submenu.

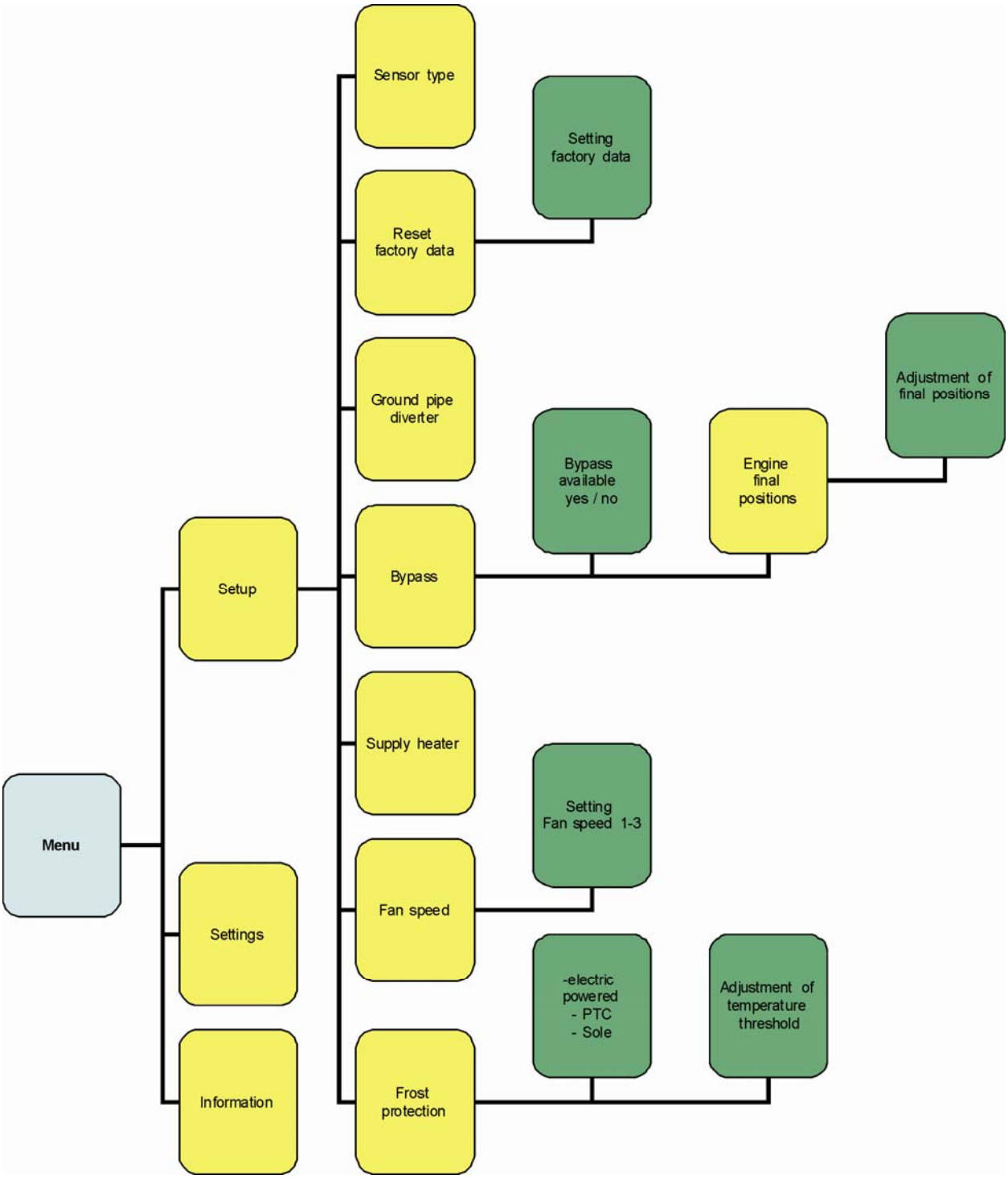


Figure 28: Menu structure of setup submenu

Sensor type
The sensor type of the operating mode automatic sensor can be determined in this menu.

Reset factory Data
Factory presets, which may have been partly overwritten by the service technician when commissioning inputs can be reset in this menu. Afterwards the device has to be turned on and off.

Ground pipe diverter
The menu is not configurable at present.

Bypass
A motor temperature-controlling bypass flap has the air flow flow through or past the heat exchanger. The extract air temperature thresholds and the end positions of the bypass flap are set here. Furthermore, the service technician can preset in this menu if a bypass flap is available at all.
The following switching conditions and auxiliary conditions are intended for the bypass:

Bypass: Open	**Switching conditions (RIGHT version of device)**	**Factory presets**
	T1 < T3 **&** T1 > x_int_min **&** T3 > x_ext_max + H_abl **||**	x_ext_min = 18.0 °C
	T1 > T3 **&** T3 < x_ext_min - H_ext	x_ext_max = 24.0 °C
	Auxiliary condition: bypass is released	H_ext = 0.5 K
		x_int_min = 15°C
Example 1 (Cooling)		
T1 (int) = 21 °C	21 < 27 & 21 > 15 & 27 > 24 + 0.5	
T3 (ext) = 27 °C		
Example 2 (Heating)		
T1 (int) = 24 °C	24 >16 & 16 < 18 - 0.5	
T3 (ext) = 16 °C		

Bypass: Closed	**Switching conditions (RIGHT version of device)**	**Factory presets**
	T1 < T3 **&** T3 < x_ext_max - H_ext **||**	x_ext_min = 18.0 °C
	T1 > T3 **&** T3 > x_ext_min + H_ext	x_ext_max = 24.0 °C
	Auxiliary condition: bypass is not released	H_ext = 0.5 K
Example 1 (Heating)		
T1 (int) = 12 °C	12 < 22 & 22 < 24 - 0.5	
T3 (ext) = 22 °C		
Example 2 (Re-cooling)		
T1 (int) = 28 °C	28 > 24 & 24 > 18 + 0.5	
T3 (ext) = 24 °C		

Supply heater
The duct temperature of the universal thermostat slave can be device-specifically preset in this menu. Furthermore, the service technician determines here if the element supplementary heating register is available or not with regard to the configuration of the system.

Fan speed
The fan output can be individually parameterised in one percent steps for each fan speed 1-3 in this menu. Thereby, the supply air fan and the extract air fan are separately adjusted. A varying fan output (imbalance) is calibrated and determined by the service technician depending on the installation situation of the ventilation device (supply air duct, extract air duct).
A change in the fan output in the setting submenu can result in a shift of the desired imbalance especially at the upper and lower limits of the characteristic curves of the fans.

Frost protection
The respective type of defroster, electric powered defroster, PTC defroster or brine defroster, which is used according to the configuration of the device is selected here.
The temperature thresholds of the frost protection operating modes “eco“ and “safe“ as well as the minimum supply air temperature of the fan slave can be set. The values of the fan slave and the defroster are deduced from the temperature thresholds “eco“ and “safe.“ The minimum intake air temperature of the fan slave is the set threshold minus 0.5 K. The set value of the defroster is the set threshold plus 0.5 K.
Here, the frost protection thresholds for the minimum supply air and the minimum intake air are preset.

- Minimum supply air temperature (presetting of 5 °C)
- Minimum intake air temperature (for presetting see Table 4)

In the event that the threshold value falls below any of the frost protection thresholds, the fans will be deactivated, the bypass flap will be closed and an error message occurs. The frost protection threshold of the minimum intake air temperature depends on the frost protection operating mode and the type of device.

Frost protection operating mode	Frost protection threshold	
	novus 300	novus F 300
“safe“	0 °C	-7 °C
“eco“	-3 °C	-10 °C

Table 4: Frost protection threshold depending on frost protection operating mode and type of device

3.8 Maintenance and Repair by Qualified Personnel

If the maintenance works on the novus are not (regularly) carried out, the functionality of the comfort ventilation will be affected in the long term.

In accordance with DIN1946/6 point 6, the maintenance service has to be performed at least every two years and it contains the inspection and cleaning of the fans, the condensate drain and the heat exchanger. The cleaning is carried out depending on the degree of soiling; the maintenance interval shall not exceed two years (important in order to protect the five-year warranty claims referring to the patented counterflow channel heat exchanger).

3.8.1 Inspection of the Condensate Drain

Check the condensate drain to make sure that it is mechanically secured and that all parts that are connected to the siphon are leak-proof. If a dry siphon is nonexistent, it has to be filled with water at all times.

3.8.2 Cleaning of the Fans

The cleaning of the fan blades can be carried out via the supply air duct connections and the exhaust air duct connections of the device. For this purpose, these air ducts have to be removed from the connection stubs. The fan blades of the impellers can be carefully vacuumed with a vacuum cleaner, but must not be touched with the suction nozzle.

Do not damage the fan blades!

3.8.3 Inspection and Cleaning of the Heat Exchanger

For this, proceed as follows:

1. Disconnect the device from the power supply.
2. Remove the maintenance flap with the magnetic clamps **A** from the front plate.

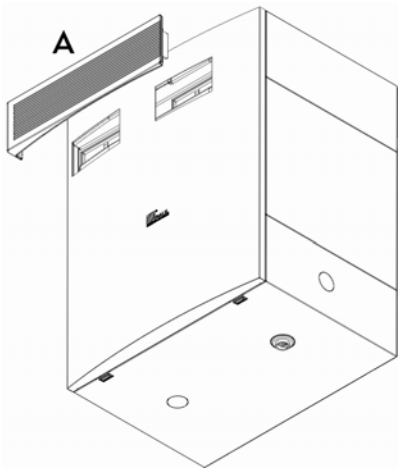


Figure 29: Removing of the maintenance flap

3. Push both snap locks **B** in order to release the front plate.

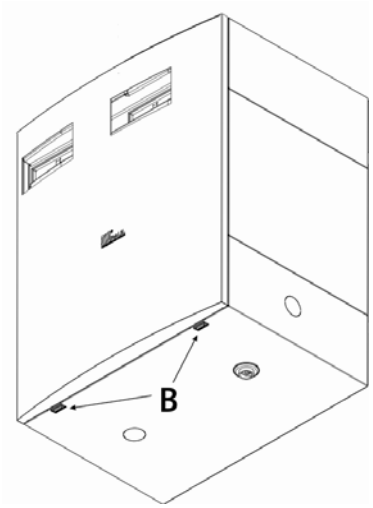


Figure 30: Pressing of the snap locks

4. Remove the front plate by approximately 5 cm from the device in the area of the snap locks and afterwards push the front plate towards the air duct connections from the slot openings of the housing.

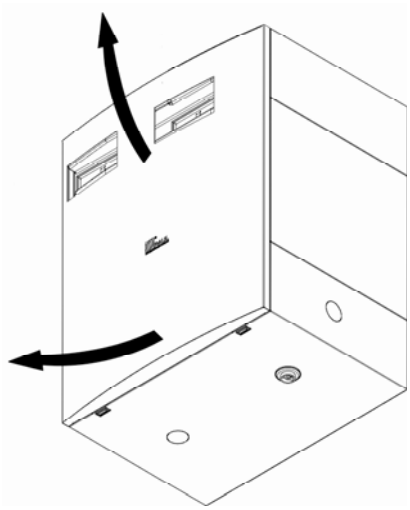


Figure 31: Removing of the front plate

5. Pull the foam covering **D** of the heat exchanger by means of the strap **C** out of the foam housing. In doing so, grasp the strap on the fastening in the area of the recessed grips of the foam covering.

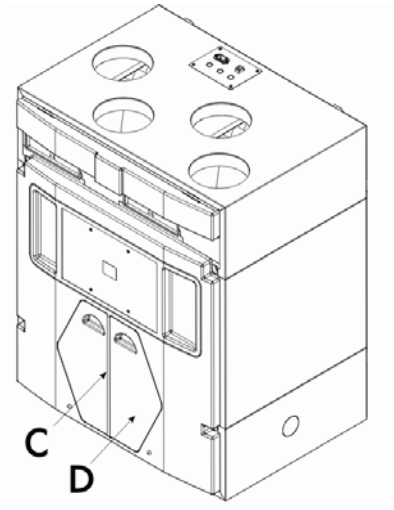


Figure 32: Foam covering **D** with strap **C**

6. Pull the heat exchanger out of the foam covering by means of the strap.
7. Clean the heat exchanger if needed.
   Cleaning of the reverse flow channel heat exchanger:
   - For this purpose immerse the heat exchanger several times in warm water (maximum 40 °C).
   - Afterwards rinse the heat exchanger thoroughly with warm tap water (maximum 40°C).
   - Hold the coloured sides of the heat exchanger with both hands and shake it out.

   Cleaning of the membrane moisture heat exchanger (enthalpy exchanger):
   - Vacuum the enthalpy exchanger with a vacuum cleaner. Use a soft brush if necessary.

Do not use water!

Do by no means use abrasive or solvent detergents!

8. Mount all parts in reversed order.
9. Restore the network connection.

3.9 Visualisation of Errors with the LED Control Panel

If an error occurs in the system, it is displayed by LEDs. The breakdown of the supply air fan or the extract air fan, a sensor error and a fall below the frost protection threshold is displayed as shown in Table 1.
In the event that another general error occurs, the LED's <L8+L11+L12> flash and the LED's L1..L7 show a binary error number. The following combinations, marked with an "x" in order to show the binary error coding, are effective:

L1	L2	L3	L4	L5	L6	L7	Meaning
x		x					Error – supply air temperature too low
x			x				Bypass error (position)
	x		x				Bypass error (electricity)
x	x		x				Bypass error (stop position OPEN)
		x	x				Bypass error (stop position CLOSED)
x		x	x				Bypass error (logic)
	x	x	x	x		x	Communication error of the fan slave
x	x	x	x	x		x	Communication error of the defroster
					x	x	Communication error of the heater battery
x					x	x	Communication error of the flap of the ground pipe diverter
		x			x	x	Communication error

Table 5: Binary error coding with the LED control panel

3.10 Visualisation of Errors with the TFT Touchpanel

A plain text visualisation of errors is only possible with the TFT Touchpanel.

3.10.1 Sensor Error of the Temperature Sensors T1…T4

Error-causing event: In the event of a broken sensor or a short circuit of a temperature sensor, a warning triangle appears at the top right of the screen .
The error can be found in menu/ information/ error display:

- Error sensor 1
- Error sensor 2
- Error sensor 3
- Error sensor 4

Response: Supply air fan and extract air fan are deactivated. The bypass is closed.
Requirement for reset: As soon as the sensor is detected error-free, the fans start at the previously activated speed and the bypass flap moves to the position where it stood before the error triggering took place.

3.10.2 Threshold Error – Supply Air Temperature Too Low

Error-causing event: In the event that the supply air temperature is too low, **T_sup < x_sup_min** (standard temperature: 5°C), a warning triangle appears at the top right of the screen .
The plain text of the error can be found in menu/ information/ error display:

- Error – supply air temperature too low

Response: Supply air fan and extract air fan are deactivated. The bypass is closed.
Requirement for reset: As soon as the threshold x_sup_min is exceeded by a minimum of 1 Kelvin per 60 seconds, the fans will start at the previously activated speed and the bypass flap moves to the position where it stood before the error triggering took place.

3.10.3 Threshold Error – Intake Air Temperature Too Low

Error-causing event: In the event that the intake air temperature is too low, **T_int < x_int_min** (Standard: -3°C), a warning triangle appears at the top right of the screen .
The plain text of the error can be found in menu/ information/ error display:

- Error – intake air temperature too low

Response: Supply air fan and extract air fan are deactivated. The bypass is closed.
Requirement for reset: As soon as the threshold x_int_min is exceeded by a minimum of 1 Kelvin per 60 seconds, the fans start at the previously activated speed and the bypass flap moves to the position where it stood before the error triggering took place.

3.10.4 Fan Rotary Speed Error

Error-causing event: In the event that the controller detects that the fan rotary speed of the supply air fan and/or the extract air fan is lower than currently preset by the program, a warning triangle appears at the top right of the screen. .
The plain text of the error can be found in menu/ information/ error display:

- Error fan 1 (Hall) or
- Error fan 2 (Hall)

Response: Supply air fan and extract air fan are deactivated. The bypass is closed.
Requirement for reset: By setting a fan speed manually, the supply air fan and the extract air fan start again and the bypass flap moves to the position where it stood before the error triggering took place.

3.10.5 Communication Error

Error-causing event: In the event that the master controller detects that a slave controller does not respond, a warning triangle appears at the top right of the screen .
The error can be found in menu/ information/ error display:

- Communication error

Response: Supply air fan and extract air fan are deactivated. The bypass is closed.
Requirement for reset: After turning the ventilation device off and on (restart), the supply air fan and the extract air fan start again and the bypass flap moves to the position where it stood before the error triggering took place.

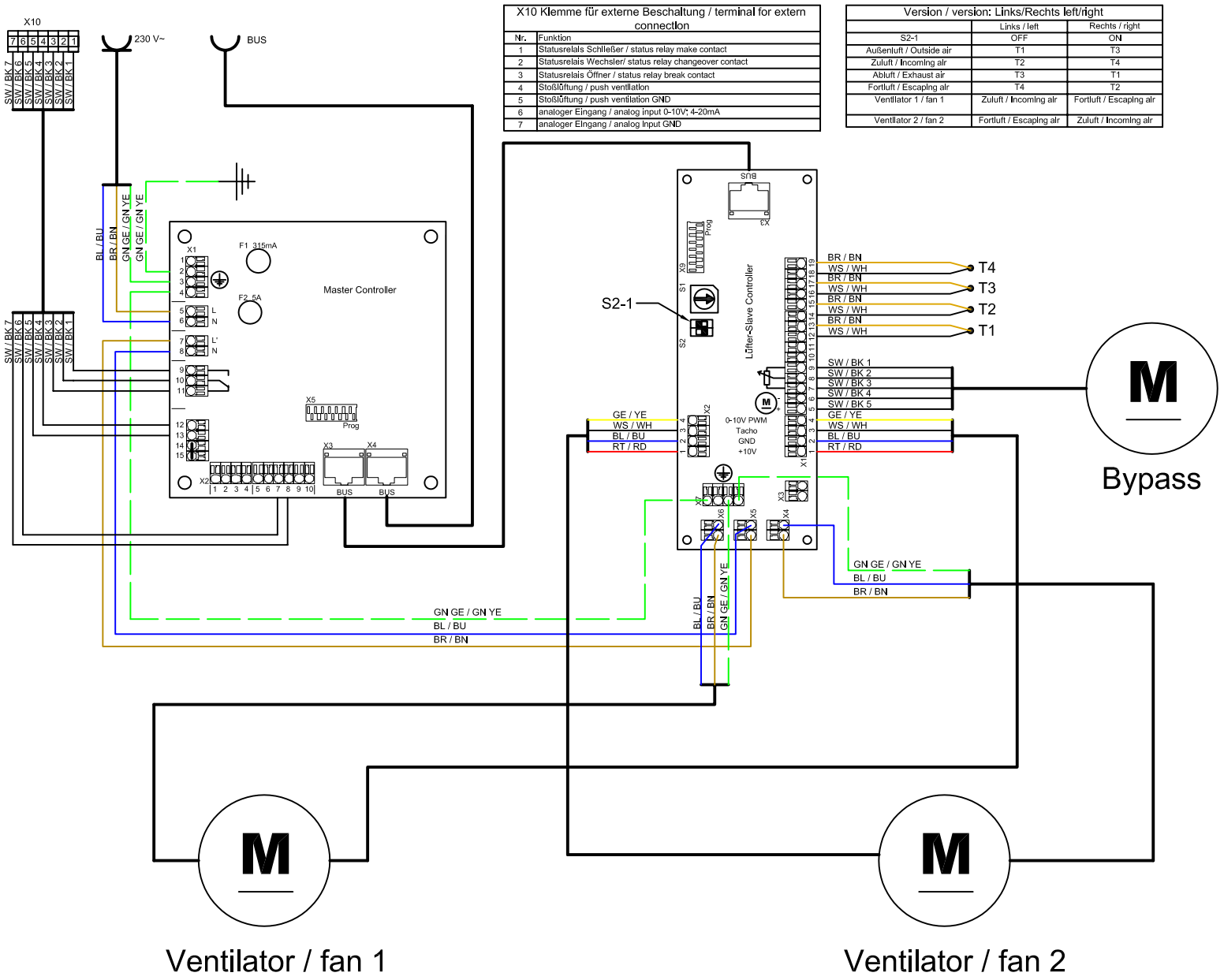
3.10.6 Message – No External Release

Message-causing event: In the event that the master controller detects that the contacts of the external release contact are non-conductively connected to one another, a warning triangle appears at the top right of the screen: .
The plain text of the message can be found in menu/ information/ messages:

- No external release

Response: Supply air fan and extract air fan are deactivated. The bypass is closed. All slaves are put in standby mode. The control unit remains readable and operable.
Requirement for reset: As soon as the contacts of the external release contact are once again conductively connected to one another, the slaves are activated and the state of things before the shutdown is once again adopted.

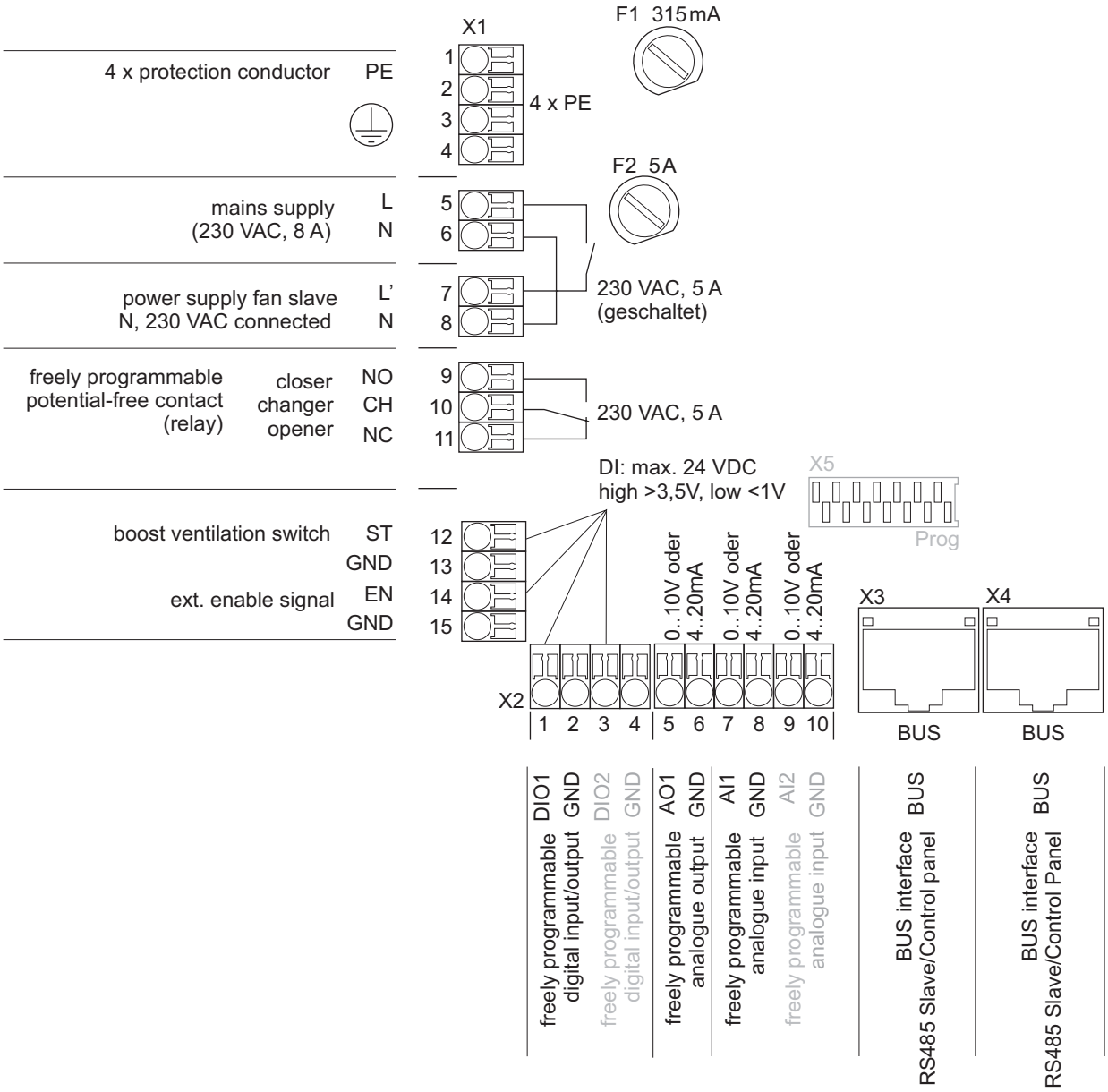
As of August 25th 2010



X10 Klemme für externe Beschaltung / terminal for extern connection	
Nr.	Funktion
1	Statusrelais Schließer / status relay make contact
2	Statusrelais Wechsler/ status relay changeover contact
3	Statusrelais Öffner / status relay break contact
4	Stoßlüftung / push ventilation
5	Stoßlüftung / push ventilation GND
6	analoger Eingang / analog input 0-10V; 4-20mA
7	analoger Eingang / analog input GND

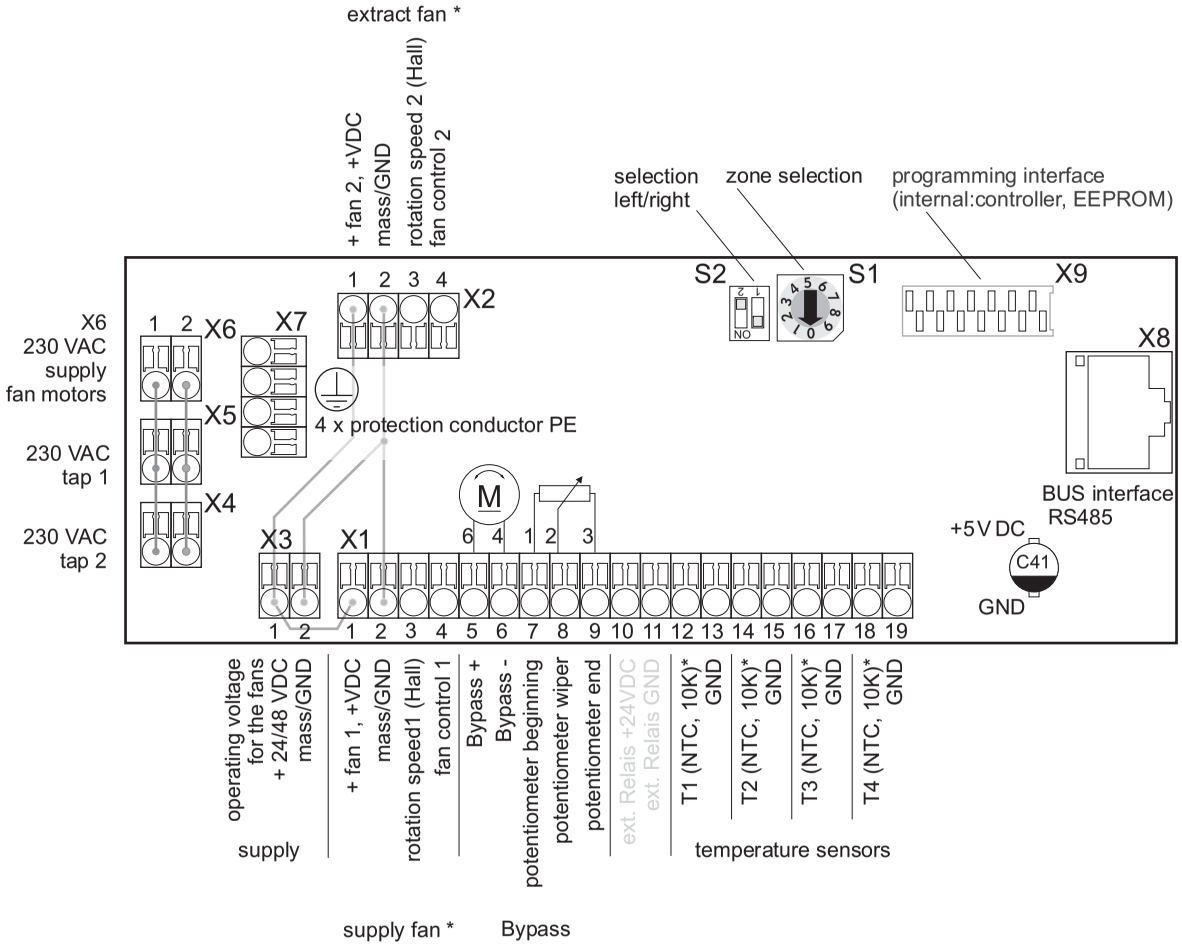
Version / version: Links/Rechts left/right		
	Links / left	Rechts / right
S2-1	OFF	ON
Außenluft / Outside air	T1	T3
Zuluft / Incoming air	T2	T4
Abluft / Exhaust air	T3	T1
Fortluft / Escaping air	T4	T2
Ventilator 1 / fan 1	Zuluft / Incoming air	Fortluft / Escaping air
Ventilator 2 / fan 2	Fortluft / Escaping air	Zuluft / Incoming air

Appendix 1: Circuit Diagram of the novus



Appendix 2: Terminal Scheme of the Master Controller

X1		**voltage supply**	
1	PE	PE through terminal	all 4 PE ducts are contacted among each other, VDE compliant
2	PE	PE	
3	PE	PE	
4	PE	PE	
5	L	230 VAC	50...60 Hz
6	N	0	
7	L'	230 VDC, relay-switched	
8	N'	230 VDC, relay-switched	
X1		**signalling contact**	
9	NO	normally open contact	freely programmable, e.g. failure or MVHR on/off
10	CH	change-over contact	250 VAC, 5 A
11	NC	normally closed contact	
X1		**digital interfaces 1 and 2**	
12	DIO1	digital input/output 1	freely programmable as digital input or output
13	GND	referential potential (ground)	
14	DIO2	digital input/output 2	freely programmable as digital input or output
15	GND	referential potential (ground)	
X2		**digital interfaces 3 and 4**	
1	DIO3	digital input/output 3	freely programmable as digital input or output
2	GND	referential potential (ground)	
3	DIO4	digital input/output 4	freely programmable as digital input or output
4	GND	referential potential (ground)	
X2		**analog interfaces**	
5	AO1	analog output	freely programmable as analog output 0...10 V or 4...20 mA
6	GND	referential potential (ground)	
7	AI1	analog input 1	freely programmable as analog input 0...10 V or 4...20 mA
8	GND	referential potential (ground)	
9	AI2	analog input 2	freely programmable as analog input 0...10 V or 4...20 mA
10	GND	referential potential (ground)	



* **version LEFT**			**version RIGHT**
S2-1	OFF	→	S2-1 ON
Intake air	T1 (green)	→	T3 (red)
Supply air	T2 (blue)	→	T4 (yellow)
Extract air	T3 (red)	→	T1 (green)
Exhaust air	T4 (yellow)	→	T2 (blue)
fan 1	supply-fan	→	extract-fan
fan 2	extract-fan	→	supply-fan

S2-2 ON	fan control: 0...10V
S2-2 OFF	fan control: PWM open collector

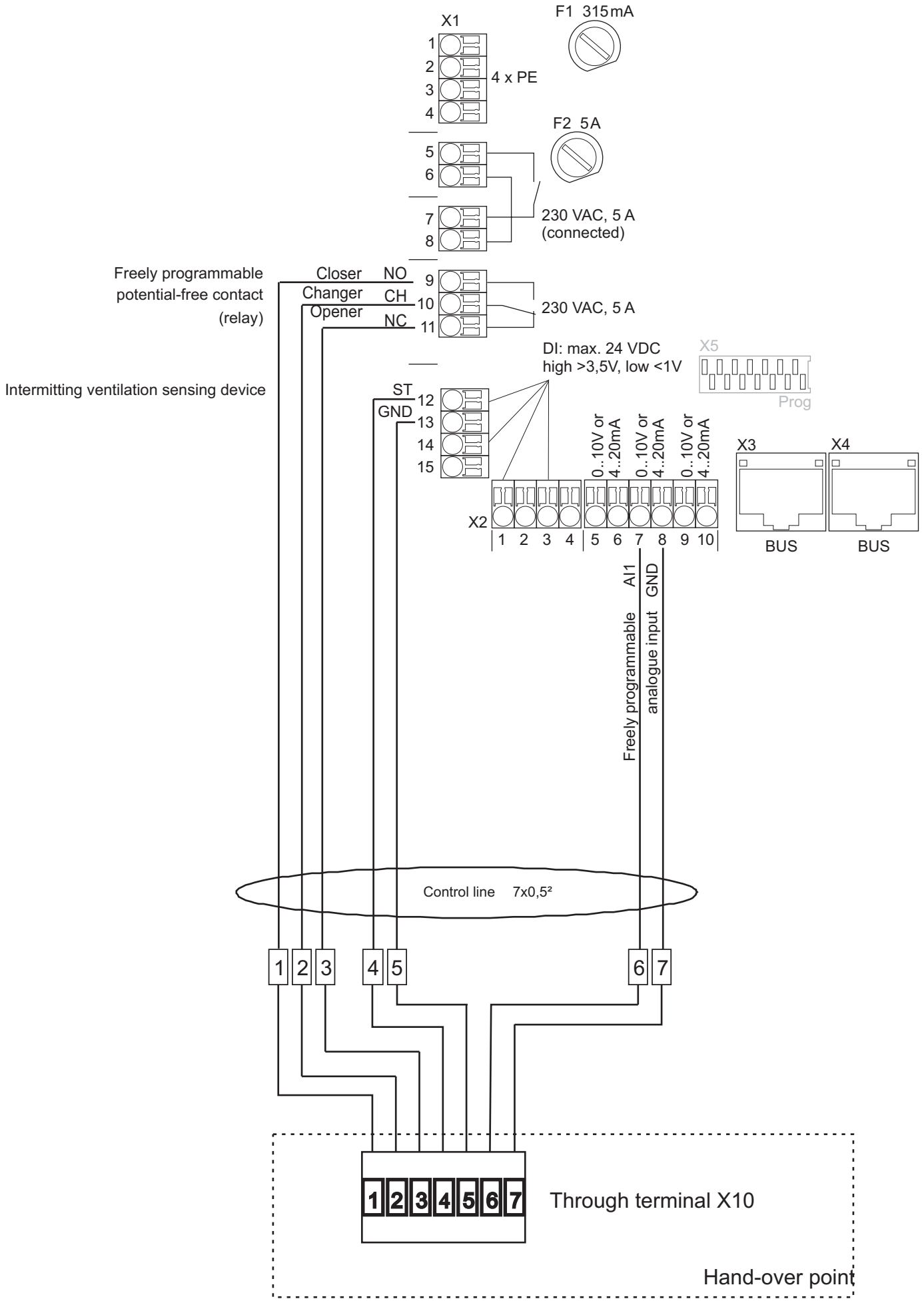
Appendix 4: Terminal Scheme of the Fan Slave Controller

X1		**fan 1** (LEFT: supply air, RIGHT: extract air)
1	48P	+ 48 VDC
2	GND	referential potential (ground)
3	DRZ 1	rotary speed (Hall)
4	0-10 V 1	0...10 VDC
5	MO+1	motor+(6)
6	MO-1	motor-(4)
7	GND	potentiometer beginning (1)
8	PTS 1	potentiometer wiper (2)
9	PTE 1	potentiometer end (3)
10	24P_BYP	external relay +24 VDC
11	RL_EX	external relay, ground
12	TMP 1	temperature sensor 1 (NTC, 10K)
13	GND	ground
14	TMP 2	temperature sensor 2 (NTC, 10K)
15	GND	ground
16	TMP 3	temperature sensor 3 (NTC, 10K)
17	GND	ground
18	TMP 4	temperature sensor 4 (NTC, 10K)
19	GND	ground

X2		**fan 2** (LEFT: extract air, RIGHT: supply air)
1	48P	+ 48 VDC
2	GND	referential potential (ground)
3	DRZ 2	rotary speed (Hall)
4	0-10 V 2	0...10 VDC
X3		**feed of fan voltage**
1	48P	+ 48 VDC
2	GND	referential potential (ground)
X4		**distribution of supply voltage**
1	N / GND	neutral / ground
2	L / 48P*	230 VAC, 50 Hz / 48 VDC*
		* via external switching power supply
X5		**distribution of supply voltage**
1	N / GND	neutral / ground
2	L / 48P	230 VAC, 50 Hz / 48 VDC*
X6		**supply voltage of the master, input**
1	N / GND	neutral / ground
2	L / 48P*	230 VAC, 50 Hz / 48 VDC*
		* via external switching power supply

X7		
1	PE	PE through terminal
2	PE	PE
3	PE	PE
4	PE	PE
X8		**BUS (RS 485)**
1	24P'	+ 24 VDC
2	24P'	+ 24 VDC
3	*(24P': BDE)*	*not busy at slave*
4	RS_B	dataline B
5	RS_A	dataline A
6	GND	referential potential (ground)
7	GND	referential potential (ground)
8	GND	referential potential (ground)

X9		**programming interface**
1	GND	OGS
2	24P'	connected 24 VDC (by the master)
3	RXD	OGS
4	*n.b.*	*not busy*
5	TXD	OGS
6	*n.b.*	*not busy*
7	TMS	JTAG
8	5P_OGS	OGS
9	TDO	JTAG
10	TDI	JTAG
11	TCK	JTAG
12	/ RES	JTAG
13	GND	JTAG
14	5P	JTAG



Appendix 6: Terminal Scheme of the Transfer Point

Date: 02.09.10

Subject to change in the interest of technical progress.

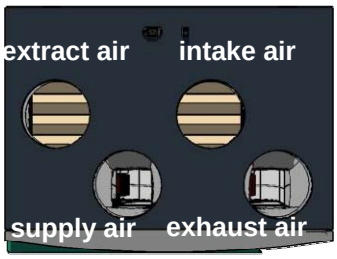
Technical Data
Mechanical Ventilation Heat Recovery Unit
novus (F) 300

PAUL WÄRMERÜCKGEWINNUNG

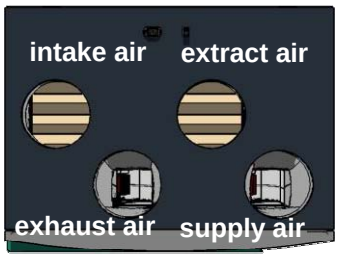
View:

COMPONENT suitable for PASSIVE HOUSES Dr. Wolfgang Feist

Versions:

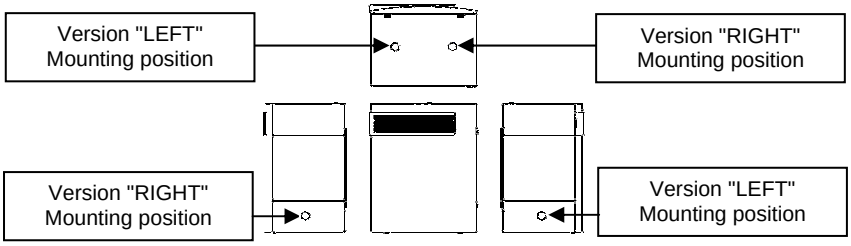


Version "LEFT"

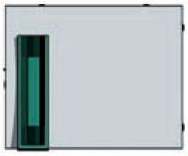


Version "RIGHT"

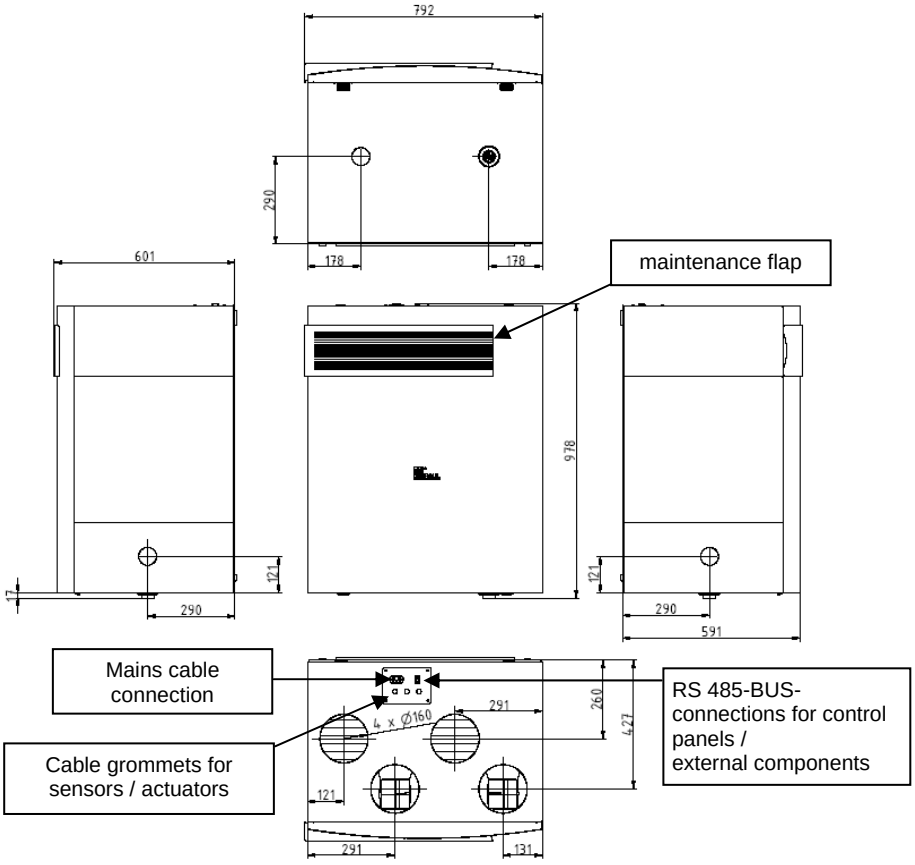
Position of condensate drain connections:



Mounting positions wall mounting or mounting frame installation:

Mounting position VERTICAL		Mounting position HORIZONTAL - LEFT		Mounting position HORIZONTAL - RIGHT	
Version "LEFT" or Version "RIGHT" possible		Connections "LEFT" only Version "LEFT" possible			Connections "RIGHT" only Version "RIGHT" possible

Dimensional sketch:



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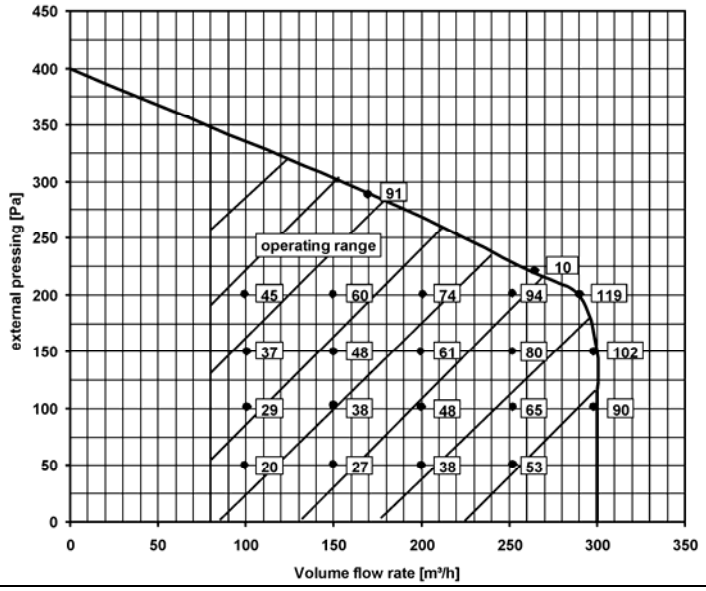
MVHR (Mechanical Ventilation Heat Recovery) **components**		
Heat exchanger	Material:	Frost limit:
	Plastics (Standard heat exchanger, PAUL patented)	-3 °C
	Cellulose (membrane-moisture-heat exchanger)	-10 °C
Fans:	EC radial fans with integrated electronics, V-constant control	
Filters:	Filter class: G4 (intake and extract air) Option: pollen filter F7 (intake air) - increase of pressure loss	
Housing:	Galvanized steel, powder coated	
Duct connections:	DN 160 (sleeve dimension)	
Condensate drain:	Valve AG 1¼“	
Bypass:	motorized summer bypass, sensor controlled, 100% tight	
Weight:	50 kg	
Electrical connection:	230 V, 50 Hz, ready for connection, with 2 m mains plug (IEC power connector)	
Protection class (acc. to EN 60335)**:**	I	
IP Code (acc. to DIN 40050)**:**	IP 40	
Appplication limits:	-20 °C to 40 °C	
Installation:	• Vertical or horizontal (special housing) - specify when ordering! • Installation in a frost-protected room, preferably > 10 °C	
Operating Data:		
Power input:	140 W	
Efficiency criterion (current):	0,23 W/m³/h with 200 m³/h; 0,24 W/m³/h with 145 m³/h	
Volume flow rate:	max. 300 m³/h	
Heat recovery rate:	93 % with 200 m³/h; 94,4 % with 145 m³/h (acc. passive house-certificate)	
Sound pressure level: (acc. to DIN EN ISO 3744, distance: 3 m)	Air flow rate [m³/h]	Sound pressure level [dB(A)]
	200	21
	300	26

Characteristic with selected performance data:



Please note:

The values in the text boxes show the power consumption in the respective operating points.

Control unit:

- Ventilation steps: OFF, ABSENT, STEP 1, STEP 2, STEP 3*
- Ventilation steps: OFF, ABSENT, STEP 1 to STEP 7**
- "Supply air only" or "extract air only" ** ("extract air only" is locked when using fireplace operating mode)
- Ventilation steps individually programmable in 1% increments (80-300 m³/h) for every ventilation step supply and extract air*
- Individually adjustable timed program for any day of the week
- Optional sensor automatic (CO2, moisture, air quality) with external sensor*
- Digital I/O interface (e.g. external OFF-contact)
- Possibility to connect boost switches
- Filter runtime monitor
- Freeze protection for downstream hot water duct heater
- Control of internal summer/winter bypass
- Simultaneous fireplace operation possible
- Power consumption in stand-by operation 1 W

Options (additional module necessary)

- Control of external defroster heater
- Control of a heating circuit or air backup duct heater
- Control of a motorized flap on ground heat exchanger

Additional information concerning control of MVHR unit

* Control function **not available** when using LED control panel
** Control function **only with** LED control panel

Control panels:

LED control panel
(WxHxD in mm: 80x80x12), listed in PEHA switch range

Colored TFT Touchpanel
(WxHxD in mm: 102x78x14)

Information on control panels / external components

- 1,5 m CAT-5-Kabel plug connection between RJ-45-jack heat recovery unit with RJ-45-wall mounted connector of adapter board (scope of delivery)
- Installation of control panels in flush socket
- Control line: J-Y(St)Y 2x2x0,6, shielded, max. 25 m
- Connecting box close to MVHR unit required (last 3 points components provided by customer)

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Date: 18.03.10 Subject to change in the interest of technical progress.	**Checklist A** **Maintenance by customer**	PAUL WÄRMERÜCKGEWINNUNG

Maintenance Work	Enter date in the quarter

1. Change both filters in the MVHR unit (change every 90 days)

Quarter / Year	I	II	III	IV
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				

2. Clean extract air prefilter / filter in extract air valves (change approx. every 2 months)

Quarter / Year	I	II	III	IV
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				

Change prefilter in fresh air line (outdoor air intake - also at ground heat exchanger)

Quarter / Year	I	II	III	IV
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				
201...				

Simplified formula for determining the local heat recovery rate η

$\eta = \frac{t_{Zu} - t_{Au}}{t_{Ab} - t_{Au}}$	Legend: - intake air temperature - extract air temperature - supply air temperature	**Note:** Air temperatures are to be measured in nominal ventilation mode with volume flow balance and sensor arrangement acc. to DIN EN 308!

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Date: 18.03.10 Subject to change in the interest of technical progress.	**Checklist B** **Maintenance by skilled personnel**	PAUL WÄRMERÜCKGEWINNUNG

Maintenance Enter result

- Inspection of MVHR unit acc. to DIN 1946-6 appendix E (normative) and appendix F (informatory)
- Hygiene check acc. to VDI 6022, Item 5.3.2
- Informal report for comments on MVHR unit's condition
- Use additional sheet of paper for adding reports of subsequent years

No.	Device	check annually	Result	201...	201...	201...	201...	201...
1	Fan / MVHR unit	Devices cleaned?	yes / no					
		Frost protection / melting devices working?	yes / no					
		Structure-borne-noise transmission, fixings are avoided?	yes / no					
		Preheater / vaporizer / heat exchanger are not contaminated?	yes / no					
		Status indicators are working?	yes / no					
2	Condensate drain and siphon	Working?	yes / no					
		Condensate disposal OK?	yes / no					
3	Electronic controls	Cable connections and clamp fixing secure?	yes / no					
		Control units working?	yes / no					
4	Air ducts / heat insulation	Cleaning done?	yes / no					
		Heat insulation and vapor barrier OK?	yes / no					
		Flexible connections between MVHR and air ducts OK? Air ducts OK?	yes / no					
5	Ground to air heat exchanger (if available)	Changeover working?	yes / no					
		Outdoor air intake free?	yes / no					
		Condition of prefilter OK?	yes / no					
		Condensate drain OK?	yes / no					
6	Fan / MVHR unit and fireplace operating mode (if available)	Safety device with firing installation working?	yes / no					
7	Fan, MVHR unit Filter, filter condition	Filters of correct filter class installed?	yes / no					
8	Extract air / supply air outlet	Fit and lock OK?	yes / no					
		Filters of correct filter class installed?	yes / no					
		Filter, filter condition OK?	yes / no					
9	Overflow air ducts	Free cross-section?	yes / no					
		No structure-borne / airborne noise transmission?	yes / no					

Date: 18.03.2010 Subject to change in the interest of technical progress.	**Air Flow Report** **Operating condition, functional check[1], instruction**	PAUL WÄRMERÜCKGEWINNUNG

Customer data		
Surname:	First name:	Tel:
Street:	ZIP:	Town:
Construction project:		

MVHR-type:	Serial-No.:	Built:

Measured data		
Measuring equipment used:	Fault descriptions during measurement:	Indoor temperature[2]
		Outdoor temperature[2]
		Weather[2]

Filter condition on calibration	Supply	Extract air		Fan speed ratio Extract air / Supply air .....
clean				
used for approx. ... days				
very dirty				

Supply air				Ventilation step: %	
No.	Room description	Project data m³/h	Project data m³/s	Measured data m³/h	Measured data m³/s

Extract air				Ventilation step: %	
No.	Room description	Project data m³/h	Project data m³/s	Measured data m³/h	Measured data m³/s

Pel = W (2 fans)

[1] The volumetric air flow is measured during normal MVHR operation 3) as agreed.
[2] acc. to DIN EN 14134, Item 7.3.1.5.
[3] acc. to DIN EN 14134, Item 7.4.1. b) end
[4] acc. to DIN 1946-6 MVHR unit has to run continuously, except for times of maintenance or repair. Use lowest ventilation step or intermittent holiday program in times of absence.

⇨ The user has been instructed on the hygienic requirements [4] for the operation of the MVHR unit
⇨ Customer has been advised that winter and summer operation influence the interior air humidity
⇨ No parts other than genuine PAUL parts (e.g. filters) shall be used, otherwise the warranty will be void
⇨ The warranty period starts with delivery ex works

Date: ..... Signatures: .....

Startup personnel / Plumber User

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Date: 18.03.10 Subject to change in the interest of technical progress.	**Commissioning and handover certificate** **Completeness and performance verifications acc. to DIN 1946-6**	PAUL WÄRMERÜCKGEWINNUNG

Customer data		
Surname:	First name:	Tel:
Street:	ZIP:	Town:
Construction project:		
MVHR-type:	Serial-No.:	Built:

Completeness

No.	Device	Ausführung	Result
1	Supply air duct	- Version as planned - Cleaning possible	yes / no yes / no
2	Supply air outlets	- Configuration as planned - Version as planned - Cleaning possible	yes / no yes / no yes / no
3	Overflow air outlets	- Configuration as planned - Version as planned	yes / no yes / no
4	Extract air outlets	- Configuration as planned - Version as planned - Cleaning possible	yes / no yes / no yes / no
5	Extract air duct	- Cleaning possible	yes / no
6	Extract air fan	- Cleaning possible	yes / no
7	Control unit	- working?	yes / no
8	Filters, optional	- Possibility to change - or clean	yes / no
9	Heat exchanger for heat recovery	- Cleaning possible	yes / no
10	Extract air heat pump, optional	- Cleaning possible	yes / no
11	Condensate drain, optional	- working?	yes / no
12	Ground to air heat exchanger, optional	- Cleaning possible	yes / no
13	Duct heater, optional	- Cleaning possible	yes / no
14	Solar panel	- Cleaning possible	yes / no
15	Documentation / manual	- available	yes / no

Function

1	Ready to use in standard mode (nominal ventilation), as planned	Result OK further steps necessary	yes / no yes / no
2	Different modes possible, as planned	Result OK further steps necessary	yes / no yes / no
3	Power consumption	Result OK further steps necessary	yes / no yes / no

Confirmation

Date: ..... Signature/Stamp:.....
Startup personnel / Plumber

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EC Declaration of Conformity

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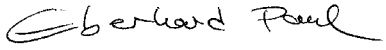
EC Declaration of Conformity

Name of the device	**: Heat recovery units:**	**novus 300 product line**
Complies with the directives	**: Machinery Directive**	**(2006/42/EC)**
	Low Voltage Directive	**(93/68/EC)**
	EMC Directive	**(89/336/EC)**

Reinsdorf, 24 März 2010
Paul Wärmerückgewinnung GmbH



Eberhard Paul
General Managing Director